THE

JOURNAL OF GAS LIGHTING,

WATER SUPPLY, & SANITARY IMPROVEMENT.

[Registered as a Newspaper.]

Vol. XXII. No. 555.] LONDON, DECEMBER 30, 1873. [25th Year.] Price 1s.

RAMSAY'S NEWCASTLE CANNEL COAL. Analysis—10,000 cubic feet of gas per ton of coal; 36-candle gas; 12¼ cwt. coke per ton of coal.

The London Exhibition in 1851 was lighted with gas made from Ramsay's Cannel.

RAMSAY'S PATENT CONDENSED COKE.
DO. GARESFIELD COKE.

RAMSAY'S FIRE-CLAY ARTICLES.

GAS-RETORTS, introduced 1838. FIRE-BRICK WORKS, established 1894. FIRE-CLAY SANITARY PIPES, CHIMNEY-TOPS, and all Goods made of Fire-Clay. The Fire-Clay is worked from Blaydon Main Colliery, is of excellent quality, and no expense spared in perfecting every article. The FIRE-BRICKS (marked "RAMSAY") are to be seen in all parts of the world, and the Works are the most extensive in the Kingdom.

Manufactories—Derwenthaugh, Swalwell, and Hebburn Quay, near Newcastle-on-Tyne; and London Wharves—Falcon Wharf, No. 20, Bankside; and Honduras Wharf, Cubitt Town. Large stocks kept.

Address G. H. RAMSAY, NEWCASTLE-ON-TYNE.

GEORGE GLOVER & CO.,

Patentees of the Standard Gasometers for the Government, and of the

IMPROVED DRY GAS-METERS.

These Meters are warranted to measure correctly and not to vary. Their acknowledged superiority has brought them into general use more rapidly than any Meters hitherto manufactured.

To meet the increasing demand, G. GLOVER AND CO. have just entered on possession of extensive premises adjoining their present Works in Ranelagh Road, and they are now prepared to execute promptly, orders to any extent. They keep in stock all sizes of Meters up to 200 lights. In cases of haste, on the receipt of a telegram early on one day, their Meters can be delivered next day in any part of England, and in the large towns in Scotland.

Particulars and lists of prices forwarded on application to—

RANELAGH ROAD, PIMLICO, LONDON, S.W.;
236, GEORGE STREET, GLASGOW;
or
15, MARKET STREET, MANCHESTER.

COWEN'S PATENT FIRE-CLAY RETORTS.

JOSEPH COWEN and CO.,

BLAYDON BURN, BLAYDON-ON-TYNE,

Were the only parties to whom a PRIZE MEDAL was awarded at the GREAT EXHIBITION of 1851, for "GAS-RETORTS and other OBJECTS in FIRE-CLAY," and they were also awarded at the INTERNATIONAL EXHIBITION of 1862, the PRIZE MEDAL for "GAS-RETORTS, FIRE-BRICKS, &c., for EXCELLENCE of QUALITY."

J. C. and Co. have been for many years the most extensive Manufacturers of Fire-Clay Retorts and Fire-Bricks in the Kingdom. Orders for Fire-Clay Retorts of all shapes and dimensions, and to fit any shaped Mouthpiece, Fire-Bricks, and every other article in Fire-Clay, are promptly executed at their Works as above.

COWEN'S GARESFIELD COALS.
Coal Office,
QUAY SIDE, NEWCASTLE-ON-TYNE.

JOS. COWEN & Co. are the only Manufacturers of FIRE-BRICKS and CLAY RETORTS at BLAYDON BURN.

JOHN RUSSELL AND CO.,

THE OLD TUBE-WORKS, WEDNESBURY
AND
THE ALMA WORKS, WALSALL.

Established at the commencement of Gas Lighting.

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5, CHARLES STREET, SOHO; and } LONDON
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35, 36, 37, & 39, GRANBY ROW, MANCHESTER.

J. R. and Co. are the original manufacturers of Wrought-Iron Gas Tubes and Fittings, and Inventors of the LAP-WELDED TUBES for Locomotive and Marine Boilers.

J. R. and Co. make all kinds of Tubes and Fittings for Gas, Steam, and Water; Gun-Metal Cocks, Stocks, and Dies; Galvanized Tubes and High-Pressure Tubes, &c.

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OF

FIRST-CLASS MATERIALS & WORKMANSHIP;

Also, STATION-METERS, PRESSURE-GAUGES, STREET-LAMPS, REGULATORS, &c.

ESTABLISHED 1830.

BLAYDON BURN AND LOW BENWELL FIRE-CLAY RETORT AND FIRE-BRICK WORKS,

NEAR NEWCASTLE-ON-TYNE.

WILLIAM COCHRAN CARR begs most respectfully to thank the Metropolitan, Provincial, and Continental Gas Companies for their patronage for several years past, and to intimate that he has rebuilt and enlarged his extensive premises for the manufacture of CLAY RETORTS; and that he is now prepared to execute the largest orders with punctuality and despatch. Orders for FIRE-CLAY RETORTS, of all shapes and sizes, FIRE-BRICKS, and all other articles in Fire-Clay, executed on the shortest notice, and on the most reasonable terms.

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J. & W. ROMANS, Consulting Gas Engineers and Coal Factors, of Edinburgh and London, CONTRACT for supplying any quantity of COAL and CANNEL.

They are also Contractors for leasing Gas-Works, for supplying, erecting, or repairing the apparatus and fire-clay goods.

Messrs. ROMANS, being lessees of several Gas-Works, have their Cannels tested in the ordinary working process, thus securing for their customers a guarantee beyond mere laboratory experiments.

Analysis, prices, and other information will be forwarded on application to their Offices, 8, Forth Street, EDINBURGH; 1, Walbrook, Mansion House, LONDON, or to the "Crown Wharf," Thomas Street, Limehouse, LONDON, where stocks of house, steam, and gas coal are always on hand.

Coal, machinery, fire goods, &c., shipped to all parts of the world.

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DUKE OF HAMILTON'S

LESMAHAGOW

CANNEL COAL.

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CROLL'S DRY GAS-METER,

PRIZE MEDALS.
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NEW YORK, 1853
PARIS, 1855.

(INVENTED & PATENTED IN 1844,)

COMBINING ALL THE LATEST IMPROVEMENTS,

MANUFACTURED ONLY BY

PRIZE MEDALS.
LONDON, 1862;
DUBLIN, 1865;
PARIS, 1867.

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238, KINGSLAND ROAD, LONDON, N.E.

MEDAL AWARDED, EXHIBITION, 1862, "FOR GOOD WORK."

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WROUGHT-IRON TUBES & FITTINGS, BRASS & COPPER TUBES,

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Tuyere Coils for Blast Furnaces, Boring Tubes, Core Bars, Gun-Metal and other Cocks, Boiler Mountings, &c.

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FOR GAS, STEAM, AND WATER;

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FOR GAS, STEAM, & WATER, EITHER BLACK, GALVANIZED, OR ENAMELLED.

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For Gas, Steam, Water, &c.

SOLE LICENSEES AND MANUFACTURERS for the United Kingdom of

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LAP-WELDED IRON & HOMOGENEOUS METAL TUBES

For Locomotive, Marine, and Stationary Boilers.

Boiler-Tube Ferrules, Gun-Metal Gland Cocks, Water-Gauges, Whistles, &c.; Stocks, Taps, and Dies for Screwing, and Gas-Fitters Tools of all kinds.

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EDINBURGH AND **GLASGOW.**

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THE UNVARYING WATER-LINE GAS-METERS,

IMPROVED DRY GAS-METERS, in Cast-Iron or Tin-Plate Cases;

STATION-METERS, ALL SIZES, up to 15 feet Square, with PLANED JOINTS;

Experimental Meters, Photometers, Pressure-Gauges,

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The only Prize Medal awarded for TUBES & FITTINGS.

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HYDRAULIC TUBES, BEDSTEAD TUBES, WELL TUBES, TELEGRAPH POSTS, COILS, &c.;

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TELESCOPIC & SINGLE GASHOLDERS,

CAST & WROUGHT IRON TANKS FOR DITTO;

PURIFIERS, CONDENSERS, SCRUBBERS, RETORTS, VALVES;

IMPROVED WROUGHT-IRON RETORT-LIDS, CROSS-BARS, & SCREWS;

AND GAS APPARATUS OF EVERY DESCRIPTION.

SOLE MANUFACTURERS OF LIVESEY'S PATENT GASHOLDER MAN-LID,

By use of which Man-lid, inlet and outlet pipes can be examined and cleansed without loss of gas in crown of holder, or ingress of atmospheric air.

ROOFS, GIRDERS, BRIDGES, AND BOILERS OF ALL KINDS.

Drawings, Specifications, and Estimates supplied on application.

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PARIS, 1867.

CLASSES 24 and 53.

WILLIAM SUGG,

GAS ENGINEER.

LONDON, 1862.

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LAMP METERS AND BOXES

IMPROVED LOWE'S JET PHOTOMETERS.

VINCENT WORKS, VINCENT STREET, WESTMINSTER, S.W.

EDWARD E. CROMBIE & CO.,

(SUCCESSORS TO N. DEFRIES AND CO.,)

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MANUFACTURERS OF

PATENT DRY TWO AND THREE DIAPHRAGM GAS-METERS,

GUARANTEED TO POSSESS THE FOLLOWING ADVANTAGES:—

Steadiness of Light; Correct Registering of Gas; Great Durability;
Cannot be Affected by Frost; Protection to Consumer and Supplier from Fraud.

UPHELD FOR FIVE YEARS FREE OF CHARGE.

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Mr. R. K. MOORHOUSE (late of T. Glover & Co.'s) will represent this Firm in the Provinces.

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NEAR LEEDS,

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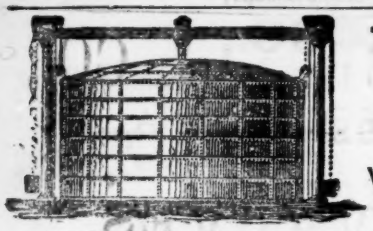
Where is always kept a Stock of Retorts, Fire-Bricks, Terra Cotta Ware, and Drain-Pipes.



W. C. HOLMES & CO.,

WHITESTONE IRON-WORKS, HUDDERSFIELD

MANUFACTURERS OF

RETORTS, ANNULAR AND PIPE CONDENSERS,

WROUGHT AND CAST RON SCRUBBERS, PURIFIERS

GASHOLDERS,

GOVERNORS, AND ALL THE NECESSARY FITTINGS FOR COMPLETING THE ERECTION OF GAS-WORKS.

STATION & CONSUMERS WET OR DRY METERS, STREET & SERVICE MAINS, LAMP COLUMNS & BRACKETS, & WROUGHT-IRON TUBES AND FITTINGS; WROUGHT-IRON ROOFS FOR ANY SIZE OF BUILDINGS.

Sole Makers of B. W. Thurston's Combined Condensing, Scrubbing, and Washing Apparatus,

AND PATENTEES OF THE IMPROVED COMBINED CONDENSING AND PURIFYING APPARATUS SO EMINENTLY ADAPTED FOR EXPORTATION.

REFERENCES TO UPWARDS OF 300 GAS-WORKS.

DANIEL HOWARD,

Successor to the late BENJAMIN WHITEHOUSE,

(ESTABLISHED IN 1765,)

BOILER AND GASHOLDER WORKS,

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MANUFACTURER OF TELESCOPE AND SINGLE GASHOLDERS,

WROUGHT & CAST IRON TANKS

FOR DITTO,

PURIFIERS, CONDENSERS, SCRUBBERS, HYDRAULIC MAINS,

And all kinds of GAS APPARATUS.

Wrought-Iron Roofs, Bridges, and Girders; Steam, Hot Water, and Range Boilers; Tanks, Cisterns, &c.,

And all kinds of Wrought-Iron Work.

DRAWINGS, SPECIFICATIONS, and ESTIMATES FURNISHED.

HODGE & CO.'S

IMPROVED VENTILATING SUN-LIGHTS

WITH TALC REFLECTORS AND SELF-ACTING VALVES

TO PREVENT DOWN-DRAUGHT;

VENTILATING GLOBE LIGHTS for DINING-ROOMS, LIBRARIES, &c.

Ormolu, Bronze, & Crystal Gaseliers;

MEDIÆVAL CHURCH WORK AND CORONÆ

COCKS, VALVES, and FITTINGS for GAS, STEAM, and WATER;

COLUMNS, BRACKETS, & STREET LANTERNS;

BLACK AND GALVANIZED BARREL COMPO AND TIN PIPE.

GAS ENGINEERS,

100, HATTON GARDEN, LONDON.

Drawings and Prices upon application.

LIME SUPERSEDED

IN THE

PURIFICATION OF ILLUMINATING GAS,

BY

Spence's Patent Dry Copperas,

The only Purifying Material which removes, by one process, all Ammonia and Sulphuretted Hydrogen. It has been in use for upwards of four years at some of the largest Gas-Works in the Kingdom.

TESTIMONIALS SENT ON APPLICATION.

SPENCE BROTHERS CHEMICAL COMPANY, LIMITED,

VICTORIA CHEMICAL WORKS, ASHTON NEW ROAD, BRADFORD, MANCHESTER,

Manufacturers of SPENCE'S PATENT DRY COPPERAS; GREEN COPPERAS;

SPENCE'S PATENT GAS DEODORIZER;

SULPHATE OF AMMONIA, GREY AND BROWN; SULPHURIC ACID; MUDIE'S DISINFECTANT, &c.

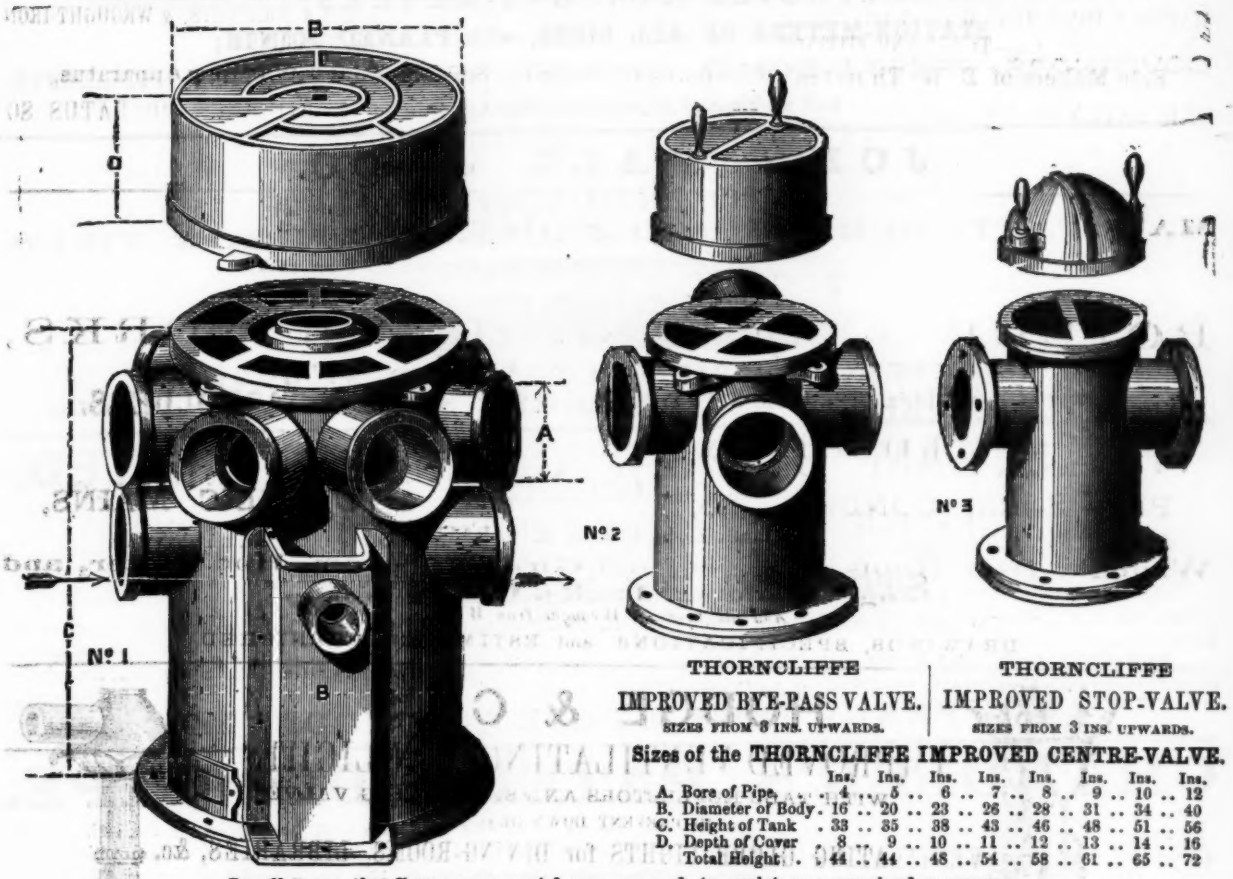
CONTRACTORS FOR THE PURCHASE OF SPENT OXIDE.

ALL COMMUNICATIONS TO BE ADDRESSED TO THE WORKS.

MESSRS. NEWTON, CHAMBERS, & CO.,

THORNCLIFFE IRON-WORKS, NEAR SHEFFIELD.

IMPROVED CENTRE-VALVES.



THORNCLIFFE IMPROVED BYE-PASS VALVE.
SIZES FROM 3 INS. UPWARDS.

THORNCLIFFE IMPROVED STOP-VALVE.
SIZES FROM 3 INS. UPWARDS.

Sizes of the THORNCLIFFE IMPROVED CENTRE-VALVE.

	Ins.	Ins.	Ins.	Ins.	Ins.	Ins.	Ins.	Ins.
A. Bore of Pipe	4 ..	5 ..	6 ..	7 ..	8 ..	9 ..	10 ..	12
B. Diameter of Body	16 ..	20 ..	23 ..	26 ..	28 ..	31 ..	34 ..	40
C. Height of Tank	33 ..	35 ..	38 ..	43 ..	46 ..	48 ..	51 ..	56
D. Depth of Cover	8 ..	9 ..	10 ..	11 ..	12 ..	13 ..	14 ..	16
Total Height	44 ..	44 ..	48 ..	54 ..	58 ..	61 ..	65 ..	72

In all cases the Covers are cast heavy enough to resist any required pressure.

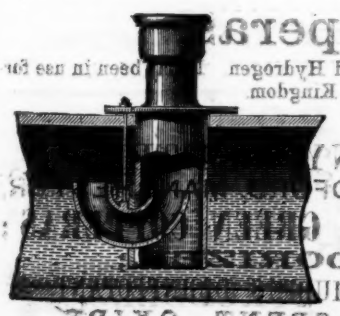
The advantages derived from the adoption of these Valves are so manifest and cardinal that in the immediate character of the change—the simplicity of the machine—the facility affording for cleaning out connexions between Valve and Purifier—the perfect collection and delivery by suitable overflow of the ammonia, at a greatly diminished depth from ground-line over the old form of Valve—the advantage of connecting on the same level, and at any angle, or opposite to each other, the inlet and outlet pipes without dip or rise—the clear acquisition of space in the purifying-house, by being able to place the boxes nearer together, the new Valve being entirely under the floor—and lastly, though of the greatest importance, the passage of crude and unpurified gas during the change is minimized to the merest fraction, thus preventing the fouling by impure gas the delicate machinery and easily affected exposed movements of the station-meter, thereby preventing the introduction of the enemy (unpurified gas) into the gasholder. Also a dead abutment is offered to all back pressure, imparting thereby to the gauges, governors, and hydraulic seals, a steadiness of action never realized with the once famous, but now fast becoming obsolete, Hydraulic Centre-Valve.

N., C., and Co. also Manufacture and Erect

PURIFIERS, CONDENSERS, SCRUBBERS, GASHOLDERS, ROOFS,

And every description of Gas Machinery.

TENDERS GIVEN FOR WORK FIXED COMPLETE IN ANY PART OF THE KINGDOM.



Messrs. N. C. & Co. are also the Sole Agents for

HAWKINS' PATENT SELF-ACTING DIP-PIPES.

These Patent Self-Acting Dip-Pipes are rapidly coming into general use by gas companies. By their use the whole of the pressure caused by the old kind of Dip-Pipes is entirely removed, therefore the yield of gas per ton of coal is considerably increased. They also act as a perfect safeguard against the deposit of carbon (or scurf) inside the retorts.

A saving of fuel is effected, and the wear and tear to the retorts greatly diminished.

They are also perfectly Self-Acting, they being regulated solely by the gas. They cannot get out of repair, and when once fixed, will last as long as the old kind, and can be easily adjusted should the hydraulic main sink; they can also be worked with advantage where there is no exhauster.

Testimonials can be had from Herbert Unwin, Esq., engineer of the Sheffield United Gaslight Company and the Penistone Gas Company. At both these companies works they have been in constant operation for several months. Further testimonials can be had on application to the Patentee, J. G. Hawkins, Effingham Street Gas-Works, Sheffield.

For Prices, &c., apply to

Messrs. NEWTON, CHAMBERS, & CO.,

THORNCLIFFE IRON-WORKS, near SHEFFIELD.

FLETCHER AND MURPHY,

GARRATT STREET WORKS, OLDHAM ROAD, MANCHESTER;

Manufacturers of

IMPROVED CONSUMERS WET GAS-METERS

IN CAST-IRON CASES,

THE UNVARYING WATER-LINE GAS-METER,

AND

IMPROVED DRY GAS-METERS;

STATION-METERS OF ALL SIZES, with PLANED JOINTS;

GOVERNORS, PRESSURE AND EXHAUST REGISTERS, TEST HOLDERS,

And all kinds of Experimental Gas Apparatus.

JOHN HALL & CO.

STOURBRIDGE,

MANUFACTURERS of FIRE-BRICKS, LUMPS, & TILES,

AND EVERY DESCRIPTION OF FIRE-CLAY GOODS.

N.B.—A Stock of 15 and 16 in. CIRCULAR RETORTS always on hand. Other kinds made to order on short Notice.

THE STEAM STOKER COMPANY, LIMITED,

ARE NOW PREPARED TO GRANT

LICENCES FOR THE USE OF THEIR VARIOUS PATENTS

FOR

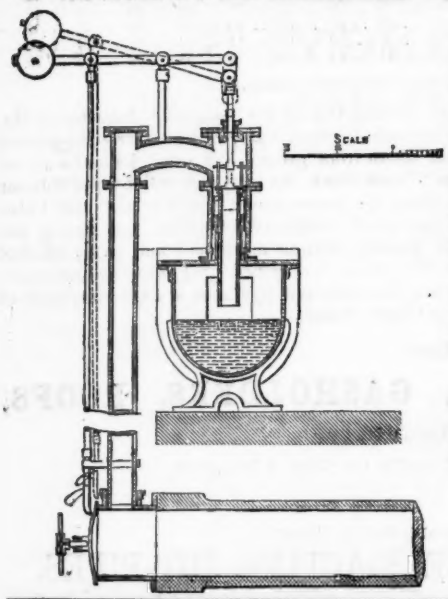
STOKING BY MACHINERY.

Under one or the other of their Patents, Machines can be adapted to almost any existing works without material alteration of the Retort-Houses or Settings.

Applications, accompanied by full particulars as to dimensions of the Retort-Houses, Settings of the Retorts, &c., &c., should be addressed to the Secretary, at the Offices of the Company,

155, FENCHURCH STREET, LONDON, E.C.

CHANDLER'S PATENT DIP-PIPE.



It is well known by all Gas Managers that back pressure upon the retorts greatly retards the production of gas, causing a deposit of carbon which keeps steadily accumulating. Such carbon reduces the capacity of the retorts, requires extra fuel for heating, and has to be frequently removed by heavy iron bars, which very much injure the retorts. By the use of Chandler's Patent Dip all these evils are entirely remedied. When the retorts are being drawn and charged, the Dip-Pipe is sealed in the fluid of the hydraulic main. As soon as the lids are replaced, the Dip is raised completely out of the fluid, and the gas passes unrestricted to the holders. By running the exhauster to a level gauge, ALL PRESSURE IS REMOVED FROM THE RETORTS. The consequence is that there is no deposit of carbon, no need of scurfing, no extra fuel is required, a large saving of wear and tear and loss of time is effected, and a greatly increased production of gas per ton of coal is realized.

The following testimonial letter has been received from the manager of the Erith Gas-Works:—

Messrs. Chandler and Sons.

Gentlemen,—I beg to inform you that during last week I carbonized 18 tons 5 cwt. of Ravensworth Pelaw Coal in a single setting of retorts fitted with your Patent Dip-Pipes, and obtained a yield of 195,800 feet of gas, equal to 10,730 feet per ton, which is a considerably greater yield than I have been able to obtain before using your Dip. The single retort fitted with your Patent Dip, which has now been in use here upwards of four months, has been throughout, and is now, quite free from carbon.

I am, gentlemen, &c.,

Erith Gas-Works, Aug. 2, 1873. (Signed) D. Vincent, Manager.

For terms of use and cost, apply only to the Patentees,

Messrs. CHANDLER & SONS, ENGINEERS AND CONTRACTORS,

YORK STREET, LONDON ROAD, SOUTHWARK, LONDON, S.E.

TO INVENTORS AND PATENTEES.

MR. W. H. BENNETT, having had considerable experience in matters connected with Gas, Water, and Sanitary Improvement, begs to say that he continues to assist Inventors in the perfection of their designs, and to obtain for them PROVISIONAL PROTECTION, whereby their invention may be secured for Six Months; or LETTERS PATENT, which are granted for Fourteen Years.

Patents completed, or proceeded with at any stage, thereby rendering it unnecessary for persons resident in the country to visit London.

Patents procured for Foreign Countries.

Information as to cost, &c., supplied gratuitously upon application to the Advertiser, 42, Parliament Street, Westminster.

THOMAS PROUD,

Brookfield Works,

103, ICKNIELD STREET EAST, BIRMINGHAM,

MANUFACTURER OF

WOOD GRIDS

FOR PURIFIERS AND SCRUBBERS,

AND

CONTRACTOR FOR GAS APPARATUS & MAIN-LAYING.

TANGYE BROTHERS & HOLMAN,

LAURENCE POUNTNEY LANE, LONDON, E.C.,

SOLE MAKERS OF

MORTON'S PATENT SELF-SEALING RETORT-LIDS,

WITH

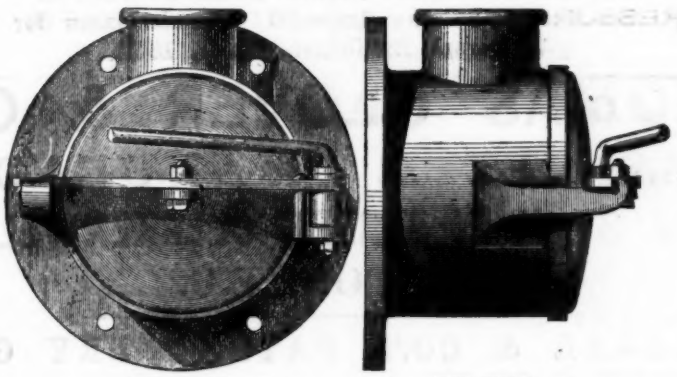
HOLMAN'S PATENT ECCENTRIC FASTENINGS.

OVER 7000 IN USE.

NO LUTING.

LIDS HINGED TO MOUTHPIECES; NO LIFTING ON OR OFF.

NO SCREWS FOR FASTENING.



FRONT VIEW. SIDE VIEW.

SIMPLE.

ECONOMICAL.

DURABLE

EFFECTIVE.

NO DUPLICATE LIDS REQUIRED.

These Lids are proved by many eminent Gas Engineers to be the most efficient, saving much time, labour, and expense; are opened and closed as quickly and with as little trouble as an ordinary furnace door, and by their use the Retorts are soundly sealed during the whole period of carbonization.

THESE LIDS ARE ADOPTED BY THE FOLLOWING (AMONG MANY OTHER) GAS COMPANIES:—

The Gaslight Company, Beckton (where over 2000 are in use).	The Gas-Works, Royal Arsenal, Woolwich.	The Nottingham Gas-Works.
,, Gaslight Company, Bow Common.	,, Alliance and Dublin Gas-Works.	,, Newcastle-on-Tyne Gas-Works.
,, London Gaslight Company.	,, Edinburgh Gas-Works.	,, Carmarthen Gas-Works.
,, Independent Gaslight Company.	,, Manchester Corporation Gas-Works.	,, Merthyr Tydfil Gas-Works.
,, Phœnix Gaslight Company.	,, Salford Corporation Gas-Works.	,, Ystrad Gas-Works.
,, South Metropolitan Gaslight Company.	,, Rochdale Corporation Gas-Works.	,, St. Alban's Gas-Works.
,, West Ham Gas Company.	,, Liverpool United Gas-Works.	,, Over Darwen Gas-Works.
,, Imperial Gaslight Company.	,, Birkenhead Gas-Works.	,, Aylesbury Gas-Works.
	,, Birmingham Gas-Works.	,, Cardiff Gas-Works.

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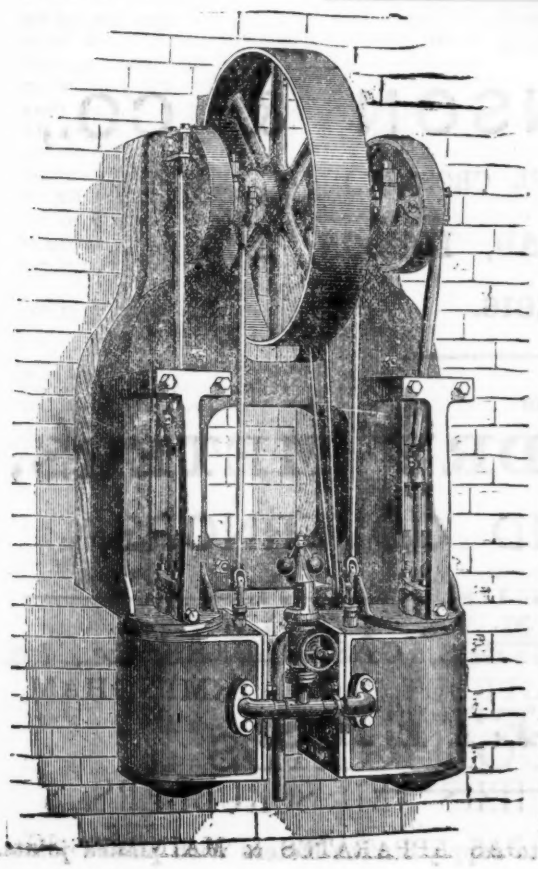

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WEEKLY ISSUE of the "JOURNAL OF GAS LIGHTING."

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METER.—1. *Under the Gas-Works Clauses Act, 1847, the reserve-fund may be resorted to for supplying deficiency in profit to make up maximum dividend or to meet any extraordinary claim or demand which may at any time arise, but in the latter case only on the certificate of two justices.* 2. *The deficiency in back dividends should have been made up out of surplus profits before laying by a reserve.* 3. *The reserve-fund, if reduced for either of the above purposes, may be restored from time to time out of surplus profits.* 4. *It is very desirable, whenever practicable, to keep the reserve or contingent fund up to its prescribed limits.*

THE JOURNAL OF GAS LIGHTING,

WATER SUPPLY, & SANITARY IMPROVEMENT.

TUESDAY, DECEMBER 30, 1873.

Notes upon Passing Events.

THE year 1873 has closed without any cessation of the assaults which it pleases a certain class of literary *doctrinaires* and Government officials, looking for promotion, to make on every private enterprise of public utility. Annexation, compulsory annexation, has been continually preached in a theoretical sense. Practically, the zeal for taking possession of the works of dividend-paying companies has considerably slackened. Wages continually rising, workmen organized against capital in a very formidable manner, and the famine price of coals, have combined to make the chances of profit from property purchased at a compulsory price less rosy than a few years ago. With respect to projects of Government appropriation of all sorts of investments, from railways to coal mines, the events of the year have not raised the character of Government management. The misappropriation of millions by the Post-Office authorities, with the acquiescence of the Chancellor of the Exchequer, the Zanzibar contracts, the queer revelations about General Boxer's inventions, the discredit cast by men of practical science on the Woolwich gun, have not improved the position of Government management, or made the higher officials anxious for public discussion. We have also learned this year that the telegraph service, like the Post-Office, is not responsible for blunders or defaults, accidental or intentional; while in the same year it has been decided that railway companies are liable to costs and damages for negligent unpunctuality. So that, altogether, the outside public, when they think about the question at all, are rather inclined to prefer squeezable and responsible companies to an irresponsible Government or Corporation.

At the present moment the newspapers are full, for want of a better text, of railway accidents, their cause, prevention, and cure; and the Board of Trade, answering to the pressure, has issued a letter in the style of a didactic essay on the general defects of railway management. The causes of railway accidents in this country are not far to seek—a network of lines, that in number and in complication exceed anything ever seen or dreamed of in any other country. To this network private enterprise makes additions, which are every year recorded with great satisfaction by the official reporter of the Board of Trade. Over this net an enormous and increasing number of trains rush continually at the highest rate of speed practised in any country. If it be considered advisable to diminish the chances of accident, it is only necessary to diminish the number of trains, and reduce the speed and accommodation to the Belgian average. If the Government really thinks it has the voice of public opinion with it, let it suggest that all the competing lines out of London shall simultaneously take the same precautionary measures, and try them for a month. This would be far more business-like than so much vague complaint. An examination of the railway map of England will show that accidents bear a strict proportion to the number of lines, number of trains, and pace.

The City of London is a complete slaughter-house of foot passengers, in spite of its excellent police, as compared with genteel Leamington or deserted Warwick, and no police regulations will make London as safe for pedestrians as Warwick or suburban Edmonton. The latest specimen of the fitness of Government to deal with a traffic question has been exhibited in the correspondence between the Metropolitan Board and Board of Works, discussing schemes for relieving the dangerous block at Hyde Park Corner and Grosvenor Place. A number of plans have been suggested for accommodating the traffic that comes through Hamilton Place, and wants to go, not east or west, but south. Lord Longford, a resident, has made one; the Marquis of Westminster, the great ground landlord, a second, the cost of which he has offered to defray; Mr. Barry, the architect, described a third some months ago; and the Metropolitan Board is prepared to make the best of them all; but as all involve an interference with that *viâ sacra*, the road through the Green Park—now reserved to privileged carriages—the Government meets the Board with a simple *non possumus*, as firm and unreasoning as the Pope's itself.

Mr. Haywood's report on the comparative slipperiness of granite, asphalte, and wood pavement is believed to be completed, and ready to lay before the Commissioners of Sewers. Some delays have necessarily taken place in consequence of the serious accident which befell that energetic officer. No doubt the report will be exhaustive, like all Mr. Haywood's reports; but it is not necessary to wait for the mass of facts and figures this report will no doubt contain. A walk along Holborn or Cheapside on any day when a sudden shower or damp fog has in five minutes completely altered the character of the asphalte, would be sufficient to convince any impartial spectator. Falling is bad enough; straining tendons, loins, muscles, cutting legs, in an attempt to avoid falling, is bad; but to fall and not be able to rise again—the fault of asphalte and of ice—is worst of all. Whether a wood pavement can be produced, durable and not slippery after wear and tear in greasy weather, remains to be seen. On that point we expect instruction from Mr. Haywood's report.

The Metropolitan Board were not charmed by ridiculous æsthetical arguments into purchasing the absurdly praised and quite decayed water-gate at the end of Buckingham Street, Strand; but it certainly would be for the convenience of the public if a footway were opened from that street on to the Embankment. We suppose that

in time ample access will be provided; at present the Embankment is by no means accessible. Cannot something be done to encourage the owners of property of a most dilapidated character to put a better face on the river front?

Employers, stimulated by the threatening tone of trades unions and of the barristers who have espoused the cause of labour against capital, are trying to form a union of capital, they called it a "federa-"tion" themselves. The difficulties of such an alliance are enormous, because the interests are so seldom in common; but if they confine their efforts within moderate limits, and devote their especial attention to meeting, with facts and figures, the exaggerated statements and unjustifiable claims of the Jenkins's, the Harrisons, the Cromptons, and other Socialistic friends of trades unions, they may do substantial service in Parliament and through the press. The idea of enforcing a contract on a penniless workmen, supported by a union, by the imposition of a fine without imprisonment, through a county court, is only another way of proposing that master and workman shall return to

> The good old rule, the simple plan,
> That he shall take who has the power,
> That he shall keep who can;

to anarchy, in fact.

The accident of the last Ashantee War has called attention to the sanitary condition of our Gold Coast possessions, and it turns out that the Government and official, and particularly military, wisdom to which a section of philosophers are anxious to confide the management of the works created by public enterprise, has contrived to add a hundredfold to the dangers of the West African climate. The whole of the water supply of Cape Coast Castle and Free Town is poisoned by the filterage of sewage, and the air by the exhalations of a rabbit-warren of cesspools. This has risen up under despotic military rule. Newspaper correspondents have brought to light sources of diseases which have existed for years without official recognition. The Earl of Kimberley—than whom no Colonial Minister ever more readily answered to the whip of public opinion—has proposed to send out a "first-class sanitary engineer." Where he is going to find him we really cannot imagine, unless Mr. Bailey Denton, disgusted by hard-hearted judges and juries, is prepared to sacrifice his life to the great African cause. This recommendation *The Times* treats with great contempt, hopes the Colonial Office will be satisfied with a sanitary doctor, considering that sanitary engineers (of the defunct Board of Health) have made such terrible blunders in their works—blunders costly in money and in health. Against this summary condemnation of his branch of the profession, Mr. Robert Rawlinson vigorously protests, and although it would be easy for us, if we cared to rip up old sores, to enumerate a dozen cases of miserable failures by official sanitary engineers, and some of them very recent, we must in candour own that Mr. Rawlinson on this occasion has reason on his side. But the requirements of the West Coast of Africa are not great. Certainly, as Mr. Rawlinson says, "to abolish horrible cesspools, to cleanse the surface and "drain the subsoil, to provide for safely passing the torrents of sur-"face water, to select appropriate sites for constructing reservoirs "and maintaining water-works," are duties which only a practical engineer could execute, and which the very cleverest doctor could not attempt satisfactorily. But as, on the very limited scale on which these sanitary works are required, no high-class engineer is needed, we have no doubt that at a very short notice Mr. Bazalgette or Mr. Haywood, or other engineers with daily experience, could recommend young men trained to the work, and quite up to constructing any amount of drains, superintending any extent of scavenging, and constructing the very familiar works required for bringing the streams of high ground to reservoirs, and thence securing a constant supply of pure water in a rough, ready, but thoroughly satisfactory style.

Another great work of public utility has been achieved by English engineers and English enterprise in the Odessa Water-Works, another of the advantages of our English system of education in the arts of engineering. Our men, not polytechnized into a groove, have now done for Odessa, a city of trade, what they had previously done, amongst others, for Berlin, the city where professors of abstract science and foul stinks both reign pre-eminent.

Another horror is next week to be unveiled and added to the monuments of London, in the shape of an equestrian statue of the late Prince Consort, on Holborn Viaduct. We cannot blame the Common Council for accepting a costly gift, or the sculptor for not being a man of genius, it requires a great deal of genius to make an equestrian statue passable. In the present instance the lowest depths of commonplace have been reached, and the Viaduct memorial may take rank with the pig-tailed king in Pall Mall and the Punch-like duke on Constitution Hill.

On reflection, the Common Council have wisely resolved not to make themselves ridiculous by defending the vain and sanguine gentlemen who hoped to be handed down to posterity by the aid of Mr. and Mrs. Melvill. The front row of Common Councilmen have been deserted by the rear ranks, and the thirty victims of Mr. Melvill's disappointed expectations will have to pay the cost of their own attorneys, as well as the damages, if any, for having encouraged a gentleman unknown to fame to attempt an historical picture. Had a great artist been employed to paint the ceremony of the Prince of Wales receiving the freedom of the City of London, and confined his efforts to the principal characters—the Prince, the Lord Mayor, and his official supporters in their robes and chains—it is just possible that a satisfactory work might have been produced; but attempts to paint portraits by the dozen never answer, except as far as the publisher of an engraving is concerned. Alderman Moon made a good thing of his engraving of the Waterloo banquet, but as a work of art the thing is dreary and dull beyond expression; yet the subjects are warriors "famed in story." Imagine the effect of a picture devoted to long lines of middle-aged thriving shopkeepers, publicans, and pawnbrokers! The idea is ridiculous.

The Canadians are beginning to rival their republican neighbours in energetic acuteness. Mr. Arch's tour has given them a chance of advertising their waste lands, advantages and privileges which they have not neglected. Nothing can be wilder than Mr. Arch's idea of transplanting 10,000 men *en bloc*, and settling in one community with the best things of the Old World and the New World about them. It was tried repeatedly after America obtained her independence; it was tried again in Australia and New Zealand, under the utterly defunct Wakefield system. It failed signally at Canterbury Colony. It succeeded more than 2000 years ago, when the Greeks founded colonies under a warrior chief ruling by the sword, assisted by the priest—the hard work done by slaves, without ships to carry back the discontented, or newspapers to print unpleasant correspondence. But although Mr. Arch has made mistakes not greater than illustrious band of Protectionists, peers, M.P.'s, and topping farmers made twenty years ago, he has struck the key-note of the right tune. Voluntary emigration of agricultural labourers will solve the pauper difficulty.

Circular to Gas Companies.

THE year which is just about to expire will be remembered by all concerned in the management of gas companies as one of general depression and of much persecution. The high price of coal, which caused so much anxiety at the beginning of, has continued all through the year, and at the present moment there are no certain indications that the coming year will see a permanent fall. Thus the price of gas continues to be raised, and there is a general outcry all over the country against the "extortion" of gas companies. Corporations raise the price also, but there are numerous people, for the most part unconcerned in the matter, who do not complain of this, for they say the profits go in aid of rates. The clever literary man, who knows nothing of anything, but can write about everything, and who is one of the worst curses of these days, takes up the story, and in one paper denounces the insatiability of "horse-leech share-"holders," and in another complains that the profits of gas-making go into "the pockets of shareholders, and benefit nobody but them." It is useless to suggest that there is no one, having £1000 invested in a gas undertaking, who would not prefer, if it were possible, to have it invested in *The Times* or *Telegraph*, or a good many other newspapers in the kingdom. Nor will we hint that it might be to the advantage of Corporations to buy up journals, now said to be necessaries of life, and apply the profits in reduction of rates. Nor, leaving the papers for the moment, will we suggest any inconsistency in a gentleman who, occupied in a business the statutory profits of which may under some circumstances exceed 5000 per cent., engages in a campaign against the metropolitan gas companies, restricted to a profit of 10 per cent. It is vain to reason with these people, and the only thing to be done is for gas companies to stand firmly on their rights, and yield no jot to the unreasonable clamour which besets them.

The year now passing away has been fruitful in "inventions," which, it was in all cases promised, would revolutionize our gas industry. Last year saw the inauguration of the "air gas" scheme; but the grand experiment was made at the Crystal Palace in the spring of the present year. The scheme, however, is already forgotten by all but the mourning shareholders and the more fortunate patentee. "Kromschrœder gas," another carburation of air, has made no progress, and the "new gas," so far as we know, has not advanced beyond the experimental stage at Chichester. "Home-"made gas" seems already to have died out of mind; and the last invention of the year—Skoines's patent—is too recent, and, as yet, too little applied to allow us to form any opinion as to the influence it is likely to have on the future of gas-making. The complete failure of some of these schemes, and the questionable success of others, confirms our belief in the stability of what we may call legitimate coal gas manufacture; and it is to the improvement of this that we would once more call the attention of all intelligent gas managers. That there is room for improvement all will admit; the direction in which the improvements must be sought is clear to most. Let us hope that the coming year will not pass away without witnessing the invention of a system of carbonizing which shall give us more and better gas with less tar, and smaller impurities to remove.

The general legislation of the year has produced but one Act affecting gas companies—the Gas and Water Works Facilities Act Amendment Act. It was brought in by the Board of Trade with great reluctance, and its working has been far from satisfactory. As we said when it passed, it is an Act which binds a company to their misfortunes rather than relieves them from their difficulties. As, however, it is a purely temporary measure, the power of the Board of Trade to grant orders ceasing in February next, we only allude to it here to recommend gas companies to be prepared to insist on their rights when another general enactment is proposed.

One event of the year was the inquiry on the application of the Chartered Company for a revision of price. It is to be repeated in the coming year, and all we can say is, that if the investigation into the company's affairs next year be as full, fair, and searching as the inquiry this year, no one can be dissatisfied at the result. The company will be able to give a perfectly satisfactory reason for selling their Beckton coke at 12s. 6d. while it fetches 22s. and more in

London, and that seems to be the heaviest charge at present brought against them.

The gas accounts of the Corporation of Manchester are before us, and although we cannot call them a "godless jumble"—the term applied by a citizen to the general accounts of the Corporation—we must still assert that they leave something to be desired. We are, for example, told what the coal carbonized costs, but not how much coal is carbonized. Then we are informed how much gas is sent out of the works, but not how much is paid for. Thus we are left without information on two important matters—the efficiency of the carbonizing department, and the amount of unaccounted-for gas. The citizens of Manchester, we think, should be informed on these points. We have estimated that the quantity of coal used in the Manchester works last year was 185,000 tons, which cost £162,100, or £1 1s. 6d. per ton. The volume of gas sent out of the works was 1,782,684,000 cubic feet, which, on our estimate, shows a production of 9636 feet per ton of coal. The capital employed in the gas-works last year was £802,500, which is equivalent to £4 6s. 9d. per ton of coal carbonized, and 9s. per 1000 feet of gas we must here say *made*, because we are unable to arrive at anything like a correct estimate of the quantity of gas *sold*. The capital per ton of coal is therefore a little higher than that of the Independent Company. As regards working expenses in detail, we are unable to make a comparison with the London companies. We may take, however, the total working expenses at £83,000, which is equivalent to 9s. per ton of coal, and 10s. 6d. per 1000 feet of gas sold. On the score of these expenses, therefore, there is but little to be said in favour of corporate management. The only two items of expenses which admit of direct comparison—namely, the cost of purification and the collector's commission—work out to just about the same figures as the average of the London companies. The gross profit of the year's working in Manchester was £63,600, which is equal to £7 13s. 7d. per cent. on the capital, and 6s. 10d. on the ton of coal carbonized. In looking at these figures it must be borne in mind that the results are deemed so unsatisfactory that the price of gas has been raised in Manchester, and yet the sums are higher than were obtained by some metropolitan companies last year. Altogether, these accounts, which our readers can study for themselves, fail to convince us that the Manchester management offers an example to be followed. But if we turn from these accounts, and endeavour to ascertain from another source what effect the possession of the gas undertaking (the water undertaking, we know, results in a loss) may have on local taxation in the city, we soon get perplexed. It is, we think, generally understood that Manchester is the most highly rated city in the kingdom. Nobody in these days thinks of setting up a mill there on account of this heavy taxation. What the rates actually amounted to in 1872 may be learned from the abstract of the municipal borough accounts recently issued. From this we gather that the produce of the borough rate in Manchester in 1872 was £149,814; other rates yielded £80,347, and tolls and dues, £28,985. The total receipts of the Corporation, exclusive, be it remembered, of the gas and water rates, and deducting the loans effected, were, as stated in this abstract, £374,000; while the expenditure, subtracting the loans repaid, was £599,000. The amount of loans outstanding when this account was closed was no less than £1,580,699. This sum, of course, does not include the debt on the water and gas undertakings, which, together, will bring the total indebtedness of the Corporation of Manchester to somewhere about 4½ millions. If we compare this with the accounts of the Liverpool Corporation, that city having over 100,000 more inhabitants, and 1200 more inhabited houses than Manchester, the contrast is most striking. The receipts of the Corporation of Liverpool, exclusive again of loans, were only £221,973, and the total expenditure only £211,860, while the indebtedness of Liverpool (the water-works being left out of the account) is merely the small sum of £15,132! We do not uphold Liverpool as a pattern of corporate management, but any one who looks at the figures we quote, and knows the condition of the two cities, will ask himself with amazement what can become of the enormous sums expended by the Corporation of Manchester; and it may be taken as perfectly certain that the possession of the gas undertaking does not reduce the rates in that city. We are free to confess that there are cities and boroughs in which the results are much more favourable; but the case of Manchester is so constantly thrown in the face of gas companies, that we feel bound to put foward the real facts. Happily in London we have as yet no Sir Joseph Heron; but, if such an affliction should befall us, we might in some years find ourselves worse off than the Municipality of Paris, as regards indebtedness, and with nothing to show for it.

The gas companies not under the supervision of the Metropolitan Board of Works will take no alarm at the resolution of that body to inquire as to the illuminating power and price of gas supplied under the provisions of the Act of 1860. Twelve-candle gas, it will be found, is a thing of the past now rarely seen, and then only under some exceptional circumstances. As a rule it will be found that at least 14-candle gas by the old standard burner is supplied by the companies who still adhere to that test, and that the others, who have adopted the new London burner at their testing-stations, keep the gas fairly above the quality required by the Act of 1860, tested by the standard then in use.

The Phœnix Company have issued a notice that from and after Jan. 1 the price of gas will be raised to their maximum, 4s. 6d. per 1000. This large advance of 9d. per 1000 we think is not wise, and is sure to bring obloquy on the company. The price should have been raised 3d. in the past half year, and then a further advance might not have been necessary.

Mr. Leslie has persuaded the vestry of St. George's, Hanover Square, to take counsel's opinion with a view to further litigation with the Chartered Gas Company. He now disputes the legality of the proceedings and award of the Revision Commissioners. The point which Mr. Leslie would raise was, we rather think, brought under the notice of Mr. Reilly, one of the commissioners, and a lawyer of great eminence, who decided in favour of the company. It is no doubt possible that a contrary opinion may be obtained, and the vestry may plunge into a lawsuit, not only with the gas company but also with the Board of Trade, the legality of whose proceedings is called in question. But we fail to see the wisdom of the course the vestry propose to follow. The point, we believe, is effectually settled by the last Act obtained by the Chartered Company, and to question the legality of the antecedent proceedings looks malicious. Mr. Leslie might remember that whichever side triumphs ratepayers and gas consumers pay the bill.

We report in another place the proceedings at the inquest consequent on the lamentable accident at Halifax. As it is probable that the accident may give rise to further legal proceedings, we shall give no opinion as to its cause; but the moral to be drawn by consumers and companies is obvious enough. It is, not to wait till things are out of order before they are attended to. A regular periodical inspection should be made of all valves, meters, and fittings, to see that they are maintained in sound working order. Such an inspection, made at least once in every quarter would save nine out of ten of the accidents that occur.

The report of Mr. A. G. Vernon Harcourt on the Cork inquiry has been published, but not the order of the Board of Trade. The commissioner has recommended that 6d. per 1000 be added to the price of gas, and 8s. to the charge for public lamps, and we presume these terms will be granted. The company, it will be remembered, asked for the addition of 9d. per 1000 to the price of gas, and 15s. to the charge for public lights. The advantage to the company is not great, but it may be accepted, as we have said before, on the principle that "half a loaf is better than no bread."

The Corporation of Dublin have requested the directors of the Dublin and Alliance Company to lay before the shareholders a proposal to purchase their undertakings for 5 per cent. annuities, and the directors have properly replied that inasmuch as the real value of the company's property is greatly in excess of the paid-up capital, they decline to submit the proposition to the shareholders. We are glad to see the new Board thus making a firm stand against the Corporation. Their position is delicate and difficult, but we feel satisfied that Parliament will not compel them to sell under their present disastrous circumstances.

The Neath Company have expressed their willingness to sell their undertakings to the borough for £25,000. Their paid-up capital amounts to £16,000, of which £10,000 is entitled to 10 per cent. and £6000 to 7 per cent., but we believe these profits have never been realized. Under any circumstances, however, the Corporation have acquired the undertakings at a very cheap rate.

It is so seldom in these days that we have the opportunity of congratulating a gas company, that we cannot pass over the instance of the Bath Company, who have recently held their half-yearly meeting. The company have so good a sale for coke that they have not yet felt the necessity to raise the price of gas, which is, we think, the lowest in the kingdom—2s. 10d. The profits, however, have fallen off considerably in the past half year, and should the high price of coal continue, gas must rise in Bath as elsewhere. At the present moment it must be said that the company are displaying great liberality to their customers.

DEATH OF SIR JOSEPH COWEN, M.P.

It is with unfeigned regret that we announce the death of Sir Joseph Cowen, M.P. for Newcastle-on-Tyne, which event took place at his residence, Stella Hall, Blaydon-on-Tyne, on Friday night, Dec. 19. For the last two months Sir Joseph, who was in the 73rd year of his age, had been in infirm health, but during the few days immediately preceding his death he had so far recovered as to encourage the hope that he might yet be restored to health for a time. On the 18th, however, a sudden relapse occurred, from which he never rallied.

Sir Joseph Cowen was born at Greenside, near Winlaton, on Feb. 10, 1800, and after receiving a suitable education, served his time as a chainmaker in the iron factory of Sir Ambrose Crowley and Co. About 1823 or 1824 he joined his brother-in-law, Mr. Anthony Forster, at Blaydon Burn, as a fire-brick maker, first acting as manager, subsequently becoming partner, and ultimately sole proprietor of the works. The development of the fire-brick business since that time, consequent on the introduction of gas lighting throughout the kingdom, has been enormous, and at the time of his death the establishment of Joseph Cowen and Co., of which he was the head, was second in importance to none. Sir Joseph was also engaged in coal mining, coke making, and farming operations; but his chief attention was directed to the manufacture of fire-clay and gas retorts, in which he introduced some valuable improvements, and obtained a patent in 1844.

From early youth down to nearly the close of his days Sir Joseph took an active part in public affairs, and as chairman of the River Tyne Improvement Commission, of which he was made a life member at its formation, he will be long and favourably remembered. His keen penetration, his clear foresight, and the indomitable energy of his character, peculiarly fitted him for the responsible and important duties which his office involved. Under his able presidency most extensive improvements were effected by the commissioners on the Tyne, and it was, as Mr. Gladstone expressed it, in acknowledg-

ment of the public service rendered for so long a time, and with so much ability, as chairman of the commission, that Her Majesty was pleased to confer on him the honour of knighthood. On the requisition of a large number of Liberal voters in Newcastle, Sir Joseph consented in 1865 to stand as a candidate for the representation of that borough, and at the election in that year, as well as at the subsequent general election in 1868, he was returned at the head of the poll. He was a close attendant upon his parliamentary duties, and a firm and unflinching champion of his party. At the time when the Commercial Treaty with France was being negotiated, Sir Joseph was invited to join Mr. Cobden and other gentlemen in Paris to settle the details of that measure, and for his services he received a medal from the French authorities, and the formal acknowledgments of both Governments.

Sir Joseph was married in 1822 to Miss Mary Newton, of Winlaton, and leaves behind him three sons and one daughter.

The tidings of his death were received with deep regret by the inhabitants of Newcastle and the surrounding districts, and his funeral, which took place on Tuesday, the 23rd inst., was attended by a large number of sorrowing friends.

We quote from the *Newcastle Daily Chronicle* the following tribute to the worth of the departed knight:—

A fair, honourable, and exemplary career came to its quiet termination in the death of Sir Joseph Cowen. The respected member for Newcastle had reached a goodly age, and though up to the day previously to that which was to witness his removal from the busy scenes of life, there was no ground for believing he would be so suddenly taken from us, it had for some time become evident that the end could not be distant. Yet, nearly to the close of the last session, Sir Joseph seldom failed in the performance of his parliamentary duties, and still more recently he occupied his wonted place at the meeting of the Tyne Commission. Sir Joseph was what is called the architect of his own fortunes. By his industry, perseverance, and ability he rose to a social position to which not many even of those who possess these qualities can hope to attain. The path to wealth is beset with temptations, but the late member for Newcastle, in the long course of his active industrial career, never forgot the duties he owed to his fellow-men. No name in connexion with the manufacturing and mercantile enterprises of this district stood higher than his. In some sense he may be said to have been the founder of a new industry; for although the properties of fire-clay were known and utilized long before his time, the improvements he introduced in the preparation and completion of the various forms in which that material has been made serviceable to man raised a previously obscure branch of commerce into an important element of national wealth. Unlike too many successful men of business, Sir Joseph never allowed his material interests to absorb the time and attention the public welfare claimed at his hands. Few men have laboured more incessantly and heartily for the advancement of what they believed to be the true interests of the nation and the locality in which their lot was cast than he. There may be more brilliant careers than that of our departed member, but there are few which are less open to adverse criticism, and very few indeed which have been so noiselessly and modestly instrumental for good.

Correspondence.

LEAKAGE.

SIR,—The above important subject will not receive much elucidation from such letters as Mr. Stevenson writes.

That leakage is in some places as low as 10 per cent. is not a question in dispute, and the *larger* experience of some men whom he does not name, as compared with his allegation of my lesser experience, of which I do not believe he is sufficiently informed, does not either affect the question, nor am I going to defend myself against his several misdirected accusations against me which he has so illogically introduced into a question, where even, if true, they have no bearing. The question which I raised, and to which I strictly confined myself, was that in a city like Cork, where few shops are open after six p.m., where the consumption of the public lamps is reduced to a minimum, and, as a rule, not lighted till long after sunset, and extinguished sometimes hours before sunrise, and paid for under average meter indication, with no large consumers such as there are in manufacturing towns, with most of its middle-class citizens living out of Cork, and out of the hearing of

> The bells of Shandon, that sound so grand on
> The lovely waters of its river Lee;

and with a working-class population that do not burn gas, with an extended system of pipeage bringing in only about £600 gas-rental per annum, and a large portion of this the pipes of an old company; that, under these circumstances, the unaccounted-for gas is never likely to be reduced to 10 per cent., as given in evidence by Mr. Stevenson on the late Board of Trade inquiry.

Mr. Stevenson's evidence was, "I could reduce the leakage anywhere—I do not care where it is—except in a mining district. I should like nothing better than to have the leakage of this company, and to be paid by results. As regards the works in Cork, I do not believe they are well managed. I believe the leakage here could be reduced to 10 per cent. I will undertake to do it on the principle of no cure, no pay. (Laughter.)"

This bid was too much for the risibility of the Cork public; but if Mr. Stevenson will convince me that the company would profit by the exercise of his services, I will be happy to consider any proposal he may have to make, and use my interest to find for him the employment he seeks.

Mr. Stevenson fails to attack one single proposition I made in proof of my opinion that the leakage in Cork was not likely to be reduced below 13 per cent., but by way of counterblast he quotes three places where it is less, as if that had any bearing on the question.

He has given Brighton!—Brighton, a first-class English town, whose season is the winter, where the wealthy denizens of London carry their families and their gold, and revel in the bracing breeze that has been wafted over the salt sea, and "keep it up till the small hours of the morning."

Then we are given Ratcliff, a hotbed of houses and gin-shops, the rendezvous of "Jack on shore," spending the cash of his twelve months cruise in as many nights, where the sound of the fiddle and the fantastic step of Jack and his sweetheart are to be heard till the latest moment allowed by law, and the outsides of the shops are a blaze of gas to tempt the honest tar inside. Why, such comparisons are an insult to the understanding, and could only be put forth by a desperate man under the most desperate circumstances.

I am sorry to have to characterize the writings of any man in this way, but truth demands it. The interests of the gentlemen engaged in the management of gas-works demand it. It cannot be permitted that the characters of nine-tenths of the profession are to be blackened by reckless assertions of mismanagement, whenever the leakage is over 10 per cent., "unless it be in a mining district."

One sentence, and one sentence only, on the extraneous matter of "gas per ton of coal," which, in the absence of argument as to leakage, Mr. Stevenson has loaded his otherwise bald letter.

Mr. Stevenson boasts that at Brighton more gas is *sold* per ton of coal than is *made* at Cork; and he winds up with the, to me, damaging remark that certainly my "forte does not lie in getting the maximum quantity of gas from a ton of coal."

Now, in the first place, I had nothing to do with the manufacture of gas at Cork; that was in the care of Mr. Still, formerly engineer at one of the stations of the Chartered Company of London; and, secondly—I pray your attention to this—the coal used by the company was chiefly Welsh coal, which is delivered in Cork at about 8s. to 10s. per ton less than Newcastle coal used at Brighton, and which the Cork Company perfectly well know makes from 1000 to 1500 feet less gas per ton than does Newcastle coal. This is a commercial question which I explained to Mr. Stevenson when I took him over the works, and I am sorry that he should so soon have forgotten a fact so important to Mr. Still's character, or to mine, had I been, as he wishes it to be believed, responsible for that department.

Mr. Stevenson's evidence was, "I do not agree in using Welsh coal. Everything here is entirely wrong; every available space is filled with breeze, for when Welsh coke is exposed it becomes useless."

This evidence must be valuable to the profession in Wales, as the question of the proper coal to use in a gas-work is a very important one, and Mr. Stevenson's argument applies almost as much to gas companies in Wales as to gas companies in the south of Ireland.

It costs 5s. to 7s. to bring coal from the Welsh ports to Cork; it will take quite as much to deliver it into many a Welsh gas-works—it takes something like double that to deliver coal from Newcastle to either place. I shall, therefore, look with interest for Mr. Stevenson's list of Welsh gas-works which "take heart of grace," and sojourn to Newcastle for their coal. *En passant*, I marvel to know what coal Mr. Stevenson uses in his works at Tenby.

It is with a sincere sense of relief that I turn to the sensible letters of "Charlemagne" and Mr. Harry Jones. I quite agree that the question of per centage of leakage is in a very undigested state. No two gas-works are in precisely the same circumstances; in fact, no one company is in the same state one year with another. Much in the same state is the "make of gas per retort," without taking into consideration that different engineers use retorts of dissimilar dimensions.

Some years ago I altered my carbonizing sheets from "gas per retort," to "gas per foot of retort surface." Something of the same kind should be done with the per centage of leakage from pipes. A pipe cannot leak till the gas comes to the surface, and if the quantity of surface of pipe were known, and the quantity of gas lost, as well as the quantity of gas passed through, were divided by the quantity of surface, the condition of a company from year to year, and of one company with another, could be more properly compared.

I throw this out for the consideration of the profession, considering that the language and the custom of the past is misleading and unscientific.

Your readers will, as I am, be obliged to Charlemagne for his statement of the law which regulates the diffusion of gases, but my phrase was, "the different specific gravities of different gases do not seem to interfere with its operation, or had nothing to do with this law, but with a well-known fact—namely, that a light gas will change places with a heavy gas, even though the light gas should be placed over the heavy gas, a fact, for instance, that does not in most cases take place with liquids. "Charlemagne" broaches a very nice idea, that the hydrogen of the gas may pass through the pores of the metal pipes, the compound gas, carburetted hydrogen, becoming, in fact, partially decomposed. I think this is not at all unlikely.

Since it is believed that all matter consists of atoms, may it not be that carburetted hydrogen is merely atoms of carbon and atoms of hydrogen lying so close together that we, in our nomenclature, speak of the two as *one* under a new name, yet from the great compressibility of gases, we know that these atoms are not so close together as they can be put by pressure. On the other hand, by removal of pressure we can expand a gas—*i.e.*, separate the particles; and may not the light hydrogen particles pass through the porous cast iron? If this be so, glazing the interior of the pipes—"blacking" them, as it is called—by "Smith's process," must be worth more than the 5s. or 6s. a ton it costs.

The statistics which we have had of Mr. Harry Jones's leakage at Ratcliff, do him the utmost credit. He is the able son of an able father, and I quite agree with him as to not being content with a 13 per cent. leakage wherever we think it can be reduced, and the evidence that he has produced of how low leakage *may* be brought, will have the effect of bestirring others who thought they were well off, to renewed efforts to still further improvements.

It would be interesting to know the mileage of Mr. Jones's mains, the quantity of gas made per annum, and the number of tons of coal used, what proportion of the gas is sold to street lights, and how the quantity so sold is arrived at.

I have heard that one of the members of the Gas Managers Association proposes to read a paper on "Leakage" at the next meeting.

If managers of gas-works, without mentioning names, were to furnish the statistics of their several places, much practical information would be obtained, and I am sure a very practical and useful discussion ensue.

I may be wrong as to the amount of unaccounted-for gas in any district. But I am not proud; I am willing to learn—to gain "more experience"—but I would like facts in preference to assertions. I can get more easily at a satisfactory estimate of the true value of the former than the latter.

For instance, if it be reasserted that "when I left Halifax the leakage was less than 10 per cent.," I would like the quantities of gas made and sold in a year, or in a series of years, given; for, as "Charlemagne" writes, there are great differences in the manner in which the per centage of leakage is arrived at. Besides, I have good substantial, honest doubts of Halifax at the period mentioned.

GEORGE ANDERSON.

19, *Northumberland Street, Strand.*

SKOINES'S PATENT GAS.

SIR,—Under this heading, Mr. G. W. Stevenson, the engineer of "The Coal Economizing Gas Company," did me the honour to criticize, in your last number, my remarks on this recent attempt to make *one* ton of coal perform the work of *two* tons, and, as appears by a leading article in *The Engineer*, published some two or three weeks since, to get, indeed, about 25 cwt. of matter of one sort or another out of a ton; and with your permission I will say a few more words on the subject, and then leave the matter to find its own level, whatever that may eventually prove to be.

It may be approximately true, as my friend says, that it does not require my "age and experience to understand that a proper setting of six retorts is heated with as small an expenditure of fuel as a setting of four retorts;" but surely no one will deny the fact, which appears to have been overlooked by the engineer of "The Coal Economizing Gas Company," that very much depends upon *what is put into the retorts*. Take an extreme case by way of illustration, and let Mr. Stevenson answer it at his leisure. What would be the difference in the quantity of fuel required to maintain at a constant heat a given number of retorts charged with dry coal, and the same number charged with cold water?

Without waiting for a reply to this problem, I venture to say that retorts employed as it is proposed to work them under this patent, will require a much greater per centage of fuel than upon the present plan of charging each retort with coal; and that the admission of steam into the retorts will be found to have an exhaustive effect upon the heat generated in the oven in which they are set; the simple fact being that in the case of a hot retort being charged with coal, the heat, which in the first hour or so is absorbed by the coal, is recovered as the process of distillation goes on, the aqueous vapours being

driven off, while the hot coke remains, and brings up the heat of the retort so as to render effective service to the succeeding charge; but in the case of the retorts into which steam is admitted, there is a continuously increasing loss of heat owing to the constant supply of vapour to take the place of that which has been expended.

As to the clear saving of 50 per cent. of coal, which depends upon the yield per ton being doubled, I am glad for Mr. Stevenson's sake to see that he hangs that and the fuel question, and the consequent final result, *all* upon an *if*; thus—"If, then, four of the six retorts be charged with coal, the fifth with chalk, and the sixth with coke, and by the admission of steam the quantity of gas available for sale is made into double the quantity of that produced from the four retorts charged with coal, there is a clear saving of 50 per cent. of coal without any increased consumption of fuel." Quite so, *if* the fuel account proves in *practice* as economical as Mr. Stevenson shows it on *paper*; but *if* there is *not* a clear saving of 50 per cent. of coal, and there *is* an important increase in the consumption of fuel, what then?

But this is not all which depends upon the *if*. What about the value of the tar and ammoniacal liquor? These bye-products are simply written off as being "always a nuisance upon a gas-work," but as they cannot be estimated as being worth less than 4s. per ton of coal carbonized, and instead of being sent to market, are converted into gas, their value must be added to the cost of the coal.

Nor does this consideration exhaust the list of objections to the invention or contrivance, for saving £1 by the expenditure of 25s.; but it is not my intention to pursue the subject in detail any further.

I will only say generally, in regard to the concluding paragraphs of Mr. Stevenson's communication, that I am much obliged by his attempt to improve my composition by the use of brackets, but, with all deference to his great literary ability, I prefer the original text, the alteration not being an improvement in any way whatever, but the reverse; and as regards the reference to the "dangerous foreign element required by Ruck's patent," I would ask, why, if it be so dangerous an element, was it included, as I see it is, in "Skoines's Patent," together with the ingenious idea of passing coal gas through tallow?

And as regards the earnest deprecation of discussion upon "patented inventions," I differ from Mr. Stevenson entirely, believing, as I always have, in discussion and the interchange of opinions as tending to the evolution and establishment of sound ideas, and the increase of general knowledge, by which the commonwealth must benefit; and so far as I am personally concerned in the attempt to improve and cheapen the manufacture of gas by means of steam and spirit, to which Mr. Stevenson has referred, I have on all occasions, and at all times, when opportunity has offered, invited and courted discussion, and I now repeat that I am at all times open to questions upon that matter, and take this opportunity of informing my professional brethren that the result of some months working of the system has deepened my conviction that it will prove to be a valuable auxiliary process.

Nothing but mechanical difficulties have stood in my way, and I believe these have now been overcome; and the gas engineers of the United Kingdom will soon have an opportunity of seeing my improved apparatus in operation, accomplishing in a successful and profitable way that which has been attempted in vain by scientific men for the last 40 years—namely, the production of gas from water, and rendering it luminiferous by spirit, at such a cost as shall make it a commercial success, and of such a character as to be free from all those objections by which it has hitherto been accompanied and its use has been prevented.

21, *Parliament Street, Westminster, S.W., Dec.* 24, 1873. R. P. SPICE.

SIR,—In reply to Mr. G. W. Stevenson's "utmost astonishment" respecting the communication I made to you relative to my experience of "Skoines's patent process," I beg to say I am not aware of the nature of the arrangement he may have made with the company; but I received instructions from the directors to alter the bench of five retorts, in accordance with the drawings and information supplied, and to test the commercial value of the process. This I did, and the results were as I represented them to you.

What Mr. Stevenson means by its being "fair, or even decent," and requiring "those having special knowledge of the subject" to make the trial, I do not know, and therefore shall take no further notice of his remarks, but at once bow to his superior knowledge and experience, and leave the result to time.

He and his "men of reputation," he says, "have vouched for certain results from a ton of coals." I, having tried the process, say those results cannot be obtained. We shall see who is right and who is wrong.

In my letter of the 20th of November, I asked the engineers who reported upon the scheme to point out the reasons of the failure. I have had no answer. I again repeat the question, and "pause for a reply."

Dublin, Dec. 24, 1873. JOHN SOMERVILLE.

GAS PURIFICATION IN LONDON.

SIR,—If Mr. Patterson has succeeded in revivifying—that is to say, depriving of its carbonic acid—the lime employed to decarbonate the soda, on the large scale, at anything like the cost he names, I congratulate him on being the inventor of a most valuable process. Should gas engineers prove blind to their interests in this matter, I shall be happy to point out other manufacturers who will be only too glad to take it up. They will, however, of course, require to see the process in operation on the large scale, as nothing else can prove its practicability.

If the revivifying process is a success, all minor points sink into insignificance; and I need only add that I was not aware it was commercially practicable.

EDMUND R. SOUTHBY.

Laboratory, 36, Willes Road, Kentish Town, Dec. 26, 1873.

QUALITY OF THE BIRMINGHAM GAS.

SIR,—Allow me to correct a statement, having reference to the illuminating power of the gas supplied in Birmingham, made by Mr. Osborne at the last monthly meeting of the Glasgow Town Council, as reported in your last issue. We *deliver* over 15 candles, and not 12, as stated, tested by the Birmingham, not the London, burner.

Our present rate to large consumers is 3s. per 1000 cubic feet, less 5 per cent. for prompt payment, and meters are supplied free of charge.

CHARLES HUNT, Engineer.

Birmingham Gaslight and Coke Company,
Windsor Street, Birmingham.

AN AMERICAN GAS ENGINEER ON GAS PURIFICATION.

SIR,—In looking over the very interesting proceedings at the late meetings of the West of Scotland Association of Gas Managers, I noticed that there was a discussion on the merits of ashes as a purifying agent for gas. For the last ten years I have used, on the first tray of my purifiers, ashes, breeze, planing-mill shavings, or any material that I could get for nothing, that would not cake, and yet arrest tarry matter before it reached the lime; but I never found any benefit as regards an increased quantity of gas purified per bushel of lime by the use of any of the above-named materials.

The most interesting part of the proceedings to me was the conversation between the president and Mr. Robb, of Haddington, in reference to the *prevention* of tarry matter reaching the purifiers. Working with high heats, this has always been a troublesome subject for me to deal with, and has led to many experiments with the view to prevention. With wet coke scrubbers we were very successful, but abandoned them on account of the deterioration in the quality of our gas. We were at one time of the same opinion as the president of the association (Mr. Key), "that increased condensing power would be a preventive." With this idea we constructed, and have used for the last five years, a condenser which consists of four cylinders, 36 inches diameter by 144 inches high. In each of these are 62 2-inch tubes, same length as the cylinders. They are connected at the bottom by a base so arranged that the gas will pass up the tubes in one cylinder and down those in the next. The connexion at the tops is similar, having a cover and water joint same as purifiers, to give easy access for cleaning (which is never required). These tubes are surrounded by water which is constantly being changed, the fresh supply entering at the gas outlet end of the condensers and travelling in an opposite direction to that of the gas. I am at present making, per 24 hours, 450,000 cubic feet of gas, and with this condenser I can reduce the temperature to 45° Fahr., and still I am obliged to use 3 inches of cinders from my ash-pans on the first tray in the purifiers, and about one inch on the bottom of the second. My idea is that this tarry matter is *condensed*, but it is held in mechanical suspension, and that to remove it we require large apparatus so that the gas will travel slowly through some medium that will give friction without increased pressure, and that can be easily cleaned without removal from the vessels.

I trust, sir, this communication from the backwoods of the North-West will be accepted in the spirit in which it is written—viz., the desire for more light on a dark subject, and that we will receive it from the scientific and practical experience of the fraternity.

JAMES H. WALKER, Engineer and Superintendent,
Milwaukee Gaslight Company, U.S.A.

Milwaukee, Wis., U.S.A., Nov. 25, 1873.

Legal Intelligence.

EDINBURGH COURT OF SESSION.

SECOND DIVISION.—SATURDAY, DEC. 20.

THE GASLIGHT AND COKE COMPANY *v.* JAMES FERGUSON AND CO. AND OTHERS.

Mr. MILLAR, Q.C., Mr. BALFOUR, and Mr. MACINTOSH appeared for the plaintiffs; the SOLICITOR-GENERAL for Scotland, Mr. WATSON, and Mr. ASHER for the defendants.

In this case, which was reported in the JOURNAL of the 15th of July last (p. 631), the plaintiffs, The Gaslight and Coke Company of London, sued the defendants, who are coalmasters at Auchenheath, for payment of £2200, as loss or damage sustained by the plaintiffs through the defendants alleged breach of contract. The plaintiffs stated that they had for a number of years past used, in the manufacture of gas, coal known as Lesmahagow gas or cannel coal, this coal yielding 13,000 cubic feet of gas per ton of an illuminating power of not less than from 33 to 36 candles, and had had contracts with the defendants for the supplying of that coal at least since July, 1866. A revised contract was entered into between the parties in February, 1870, for a supply of that description of coal by the defendants to the plaintiffs to the extent of 30,000 tons, at 25s. a ton, f. o. b. at Granton, for net cash against bills of lading; 25,000 tons to be delivered in 1870, and the other 5000 in the beginning of 1871. Throughout 1870 and the earlier part of 1871 the defendants supplied coal in professed fulfilment of the contract; but from the latter part of December, 1870, onwards, the plaintiffs began to find that the coal supplied was not of the description or quality contracted for. That discovery was at once intimated to the defendants, but, induced by the latter's assurances that suitable deduction from the price would be made, the plaintiffs continued to use the coal. These assurances were not fulfilled, and the present action became necessary. The defence was, first, the general plea that the statements by the plaintiffs were not relevant or sufficient to support the conclusions of the summons, and a general allegation that the plaintiffs statements were unfounded in fact. There was a further plea that the plaintiffs having taken delivery of, retained, and used the coals in question, they were not entitled to claim damages in respect to the alleged disconformity thereof to contract; also, *separatim*, that the present action could not be maintained in respect of the provisions [in the 5th section of the Act 19 and 20 Vict., c. 60. The Lord Ordinary, after hearing evidence in the case, acquitted the defendants, and gave them expenses, on the ground that the plaintiffs had failed to prove their grounds of action. The plaintiffs now appealed to the Inner House.

The court recently heard counsel on the appeal note, and to-day, in giving judgment on the case, unanimously adhered to the interlocutor of the Lord Ordinary.

MANSION HOUSE POLICE COURT.—LONDON, FRIDAY, DEC. 19.

(*Before the* LORD MAYOR.)

UNLAWFULLY DISCONNECTING A METER.

Mr. *John Webb*, a gas-fitter in Westminster, was summoned by the Chartered Gas Company for having unlawfully disconnected a meter by which their gas had been registered, without giving 24 hours notice in writing to them of his intention so to do.

Mr. BESLEY, who appeared for the company, stated that on the 20th of November, the defendant, at some premises in St. Swithin's Lane, on which he was engaged, disconnected the gas, and instead of securing the aperture with a plug and white lead, according to the authorized and workmanlike practice, merely stopped it up with a cork, using no white lead. The defendant, moreover, well knew, as a practical gas-fitter, that the company ought to have had 24 hours notice of the intention to disconnect the meter, and how exceedingly dangerous it was to do the work in any other than the proper manner, having regard to the possibility of fire or explosion in a dense part of the City.

The facts not being in dispute, the LORD MAYOR asked the defendant what he had to say in answer to the complaint. He replied that the matter had taken him entirely by surprise; that he had received orders to remove the fittings from St. Swithin's Lane to Westminster, and that he ordered a most trustworthy workman, who had been in his service 15 years, to do the job. He was not aware, until he received the summons, that the man had done the work otherwise than properly. If he had known that there had been any shortcoming in that respect, he should not have left the premises until it had been remedied. Besides, main-cocks were the property of the consumer, and a main-cock in this case was the only thing that was removed.

The LORD MAYOR said the gas company were perfectly right in preferring the complaint, having regard to the consequences that might have ensued from such neglect, and the defendant, being a practical man, was the less excusable. The full penalty for such an offence was £5, but as the gas company did not wish to be hard upon the defendant, he fined him £2 10s. and 3s. costs, with the alternative of 14 days imprisonment.

The defendant paid the money.

GREENWICH POLICE COURT.—WEDNESDAY, DEC. 24.

(*Before Mr.* PATTESON.)

George Elliott and *George Moss* appeared to answer summonses taken out against them by the Surrey Consumers Gas Company, under the Master and Servant Act (30 & 31 Vict., c. 141, secs. 4, 9, & 14), for neglecting and refusing to fulfil a contract of service between them and the plaintiffs.

Mr. POLAND appeared for the prosecution, and Mr. BARTON for the defence.

The defendants pleaded "Not guilty."

Mr. POLAND, in stating the case, said the defendants had been guilty of an offence which, if unchecked, might lead to very serious consequences. They were stokers in the employment of the Surrey Consumers Gas Company, at very good wages. They received those wages weekly, and were bound to give or entitled to receive a week's notice before discharging themselves or being discharged. The evidence would show that on Monday, the 15th inst., being at that time a part of the night gang of stokers, they left their employment about an hour after the labour of the night commenced, and persistently refused to return to work when urged to do so by the foreman. The consequence was that it became necessary to employ other men in their place to prevent loss and inconvenience to the company. These men were perfectly free to terminate their contract of service on giving a week's notice, but they had not done so. Having just entered upon a new week's duties, they chose at once to break their contract. The facts were very plain and simple, and the offence was an aggravated one. The company, however, did not wish to press heavily against the defendants; they felt it their duty to bring the case before the court, and they were content to leave the matter in the hands of the magistrate when the evidence was produced.

Mr. *Henry Finlay* said he was the engineer of the Surrey Consumers Gas Company, and had charge of their works at Rotherhithe. The company supplied gas to the south-east portion of London, from London Bridge to Deptford. They employed about 100 men in the retort-house—firemen, scoopmen, &c. The defendant Elliott had been in the company's service nearly twelve months. He was taken on just after the strike in December, 1872. He was engaged at weekly wages, in the first instance to attend to the fires. His wages were 38s. 9d. per week, and some perquisites in addition. He had two days holiday in the summer, a joint of meat at Christmas, and was supplied with oatmeal and lime-juice while at work. He had latterly worked in the night gang, whose wages were paid every Friday. The day men were paid on Saturday. The men changed from the night to the day gang, and *vice versâ* every month. The defendant Moss was engaged by the superintendent of the works as odd man originally, and had been in the service of the company about two months. He had since become a regular hand; his wages were 37s. 4d. a week. The gang consists of ten men, and they do an hour's work, and then get an hour's spell, all through the night. Two men out of the ten going away from their work causes great inconvenience, the remaining eight cannot do their work properly. The retorts are kept open much longer than they ought to be, and the company suffer a loss in consequence. The quality of the gas would not be much affected by two men only going, but if several others followed their example, the quality and the quantity would suffer materially. There had been no change in the character of the work the defendants were required to perform to lead them to complain.

Cross-examined by Mr. BARTON: He did not see the defendants on the night in question. To his knowledge there was no difference in their work that night. If there had been, the instructions would have been given to the foreman by him. The coke had not to be taken a farther distance than usual that night.

Mr. *Charles Warner* said he had been in the service of the company for the last 20 years, and resided on the works. He was foreman of the night shift. The defendant, Elliott, had been employed by the company for the last eleven or twelve months. He was a scoopman—a leading hand in the gang, which consisted of ten men. Moss worked in the same gang on the opposite side. He had been about two months in the service of the company, and was taken on as regular man by witness under Mr. Millar's orders. On the night in question the men came to their work at ten minutes to seven, and went on very comfortably at first. There were 22 retorts drawn in the one draw. They had been at work about an hour when they left, as he (witness) supposed to get their suppers. They returned about ten minutes to nine, and went into the lobby and dressed themselves instead of going on with their employment. Witness had occasion to go to the blacksmith's shop, and on his return he was told what had occurred. He went into the lobby and found the defendants dressed and ready to go out. He asked the reason they had left their work, and Elliott said he should do no more, and using a foul expression, declared it would kill a man to take the coke so far. Witness turned to Moss and asked whether he intended to go on with his work. He said he would do no more, and using a similar expression to that used by Elliott, said it would pull a man's arms out to take the coke where they were required to take it. Witness tried to reason with them, and assured them that during the 20 years he had been in the company's service there had been no alteration in the work. In fact, the defendants had not then to take the coke so far as some of the men had by from 30 to 50 yards. Witness asked them to complete their night's work, and told them they might work out of any door which they thought was nearest. They still persisted, however, that they would do no more. Witness requested them not to leave him without sufficient help to carry on the work, and reminded them that they were under a week's notice. He also told them that if they left they would be liable to be locked up, to which they replied, "We may as well be locked up as kill ourselves." Elliott, when told that he was under a week's notice, said he had never signed any document. Witness then sent messengers to find men to take defendant's places, and to the day foreman to ask for advice. After a delay of one hour and 25 minutes two other men were procured. It was rather a longer distance to take the coke than it was all last summer, when there was no stock; but the other men had to take their coke as far, and were still doing so. The consequence of working with only eight men was to throw the draw back; the men could not get on so well with their work, and there would not be the same return of gas. When Mr. Miller came he told the defendants that they might take the coke where they liked so that they completed their night's work.

Cross-examined by Mr. BARTON: The defendants had made no complaint to witness of a difference in their work, and gave him no reason for their conduct. They did not, after half an hour's conversation, offer to complete their night's work. Witness refused to allow them to go back to it after he obtained other men in their place. Defendants had not signed any contract for a week's notice, but they knew that that was the usual custom of the company.

Mr. *George Miller* said he was the day foreman of the works. About half-past nine on the night of the 15th he was sent for by the last witness. When he went to the retort-house he found the two defendants standing there dressed, and not in their working apparel. They said they would not return to their duty under any circumstances. He told them they might take the coke out of any door they liked, but they refused to do any more work. Two other men, who had been at work all day, were then sent for, and they came and took defendants places.

Cross-examined by Mr. BARTON: Witness told defendants that they must go on with their work, and give a week's notice if they wanted to leave. They did not offer to complete their night's work until the other men came in. Elliott then said to Moss, "Shall we go back?" Moss made no answer. There was no difference in the work that night; in fact, witness thought they had not so far to carry the coke. It was not usual to dismiss men without a week's notice unless there was some fault.

By the MAGISTRATE: The men were not always told that a week's notice was required; but it was well known to be the rule.

Mr. POLAND said in this case the men had entered upon a new week's service, so that the question of notice would not arise.

Witness said Elliott was a very obstinate man, and he had told him on former occasions that if he was dissatisfied with his work he should give a week's notice and leave. He had told him that about three weeks before.

Mr. BARTON said, as he was instructed, these men had been at work for some time in the company's service, and they did their work properly until the night in question. They alleged that the work was then altered, and that they had to wheel the coke from the retorts a considerable distance farther. They kept on for upwards of an hour, and finding the work too hard for them, they declined to go on for a time. When the day foreman came they offered to finish their night's work, but the night foreman refused to allow them, because he said he had obtained other men in their places. They were perfectly ready to go on after an hour's delay if they had been permitted. This was all he could say in their defence. As to the loss to the company, all that they had suffered was an hour's delay in their work.

The MAGISTRATE said he was very glad that this case was not of a similar character to those upon which, unfortunately, he was called upon to adjudicate a year ago in connexion with the Beckton Gas-Works. There was no doubt that the defendants had broken their contracts with their employers. It was very much to be regretted that persons like them, in receipt of good wages, should act in this way, and refuse to do work which other men, who had been employed all the previous day, were content to take up and finish. The defendants had committed a serious offence, and one which caused a great deal of delay and discomfort to their masters. They must now be imprisoned for 21 days.

After the defendants had been removed,

Mr. POLAND said he had been speaking to the chairman of the company, who was desirous not to press heavily upon the defendants. It was absolutely necessary that these proceedings should be taken by way of example, and that the law on the subject should be known; but if, upon consideration, the magistrate felt it would be consistent with his duty to inflict a fine upon the defendants instead of sending them to prison, he should be glad.

The MAGISTRATE said he had passed a light sentence upon the defendants already because of Mr. Poland's opening remarks, but upon this appeal from the company he was willing to reconsider the matter.

The defendants were brought back into court, and Mr. POLAND renewed his application, and pointed out that under the 9th section of the Act the magistrate had the option of inflicting a fine. If it was thought that the justice of the case would thus be met, the company did not ask for the heavier sentence.

Mr. BARTON hoped the magistrate would listen to the appeal of the plaintiffs, and believed that the infliction of a fine would be a sufficient penalty to serve as an example.

The MAGISTRATE, acting on the recommendation of the plaintiffs, said he would inflict a fine on each defendant of £3, or 21 days imprisonment.

Miscellaneous News.

METROPOLIS GAS SUPPLY.

METROPOLITAN BOARD OF WORKS.

At the Meeting of the Board on Friday, Dec. 19—Colonel HOGG, M.P., presiding,

A deputation from the vestry of Paddington attended to present a memorial urging the board to oppose the application of the Imperial Company to the Board of Trade for a revision of price.

The memorial was referred to the Works and General Purposes Committee.

Mr. NEWTON, according to notice, moved—"That it be referred to Mr. Keates, the superintending gas examiner of the board, to report on the illuminating power and price of the gas supplied to the metropolis by those companies not under the supervision of the board, and that the co-operation of the several gas examiners appointed by the vestries and district boards be obtained for this purpose, where necessary." He said the board would, he hoped, see the necessity of taking up the question of the proposed action by some of the companies very vigorously. Last year, when the question was before them, great difficulty was experienced in carrying out their intentions, because the local boards and vestries were not then, as now, fully alive to the importance of their co-operation. When the matter was discussed a fortnight previously, he made a statement to the effect that some of the smaller gas companies of the metropolis were supplying gas on much more favourable terms than the larger companies which were about to seek a revision of price. He found, on referring to the report of what he then said, that his remarks had given rise to some observations in the public press, which it was desirable to reply to. The JOURNAL OF GAS LIGHTING seemed to deny the correctness of his statements that the Chartered Company were seeking a further increase beyond the price which the commissioners had sanctioned for the current year. The letter which that company addressed to the board commenced thus: "It having become evident to the directors that a further increase in the price of gas is necessary to meet the extraordinary expenses of the year 1874——." These words certainly justified the remark that it was intended to ask for an increase upon the price charged in the present year, and not simply for permission to maintain that price. In drawing attention, as he did on the last occasion, to some of the other companies, especially to those which supplied gas in the district he represented, he stated that they charged a less price to the public. Referring to his remarks in a leading article, the *Standard* newspaper asserted, or rather assumed, that these companies supplied gas of a very inferior illuminating power to that furnished by the Chartered Company. The *Standard* stated that the Commercial Company, for example, supplied only 12-candle gas, according to Act of Parliament, and they argued that, comparing this gas with the 16-candle gas of the Chartered Company, the difference in price was more than accounted for. But there was here a false assumption. It was true that the Metropolis Gas Act, 1860, under which the Commercial Company were supplying gas, fixed the maximum price at 4s. 6d., and the minimum illuminating power at 12 candles, without any revision. As a matter of fact, however, though they could charge 4s. 6d., they were only charging 4s., and though they were not under obligations to give a higher illuminating power than 12 candles, they did in reality supply gas of a quality nearly, if not quite, equal to that furnished by the Chartered Company. The gas examiner of his (Mr. Newton's) vestry, in his annual report, stated that the gas of the Commercial Company was equal to 14 3-10ths candles, tested by the old burner. By the new burner this gas would have shown an illuminating power of nearly two candles higher. Tested in the mode adopted by the officers of the Metropolitan Board, with the gas supplied by the Imperial and Chartered Companies, it would prove to be at least 16-candle gas. He mentioned these circumstances to show how necessary it was that the chief examiner to the board should be instructed at once to prepare the evidence that would be required in opposing the applications before the Board of Trade Commissioners. He believed that more important results would arise from the next inquiry than had arisen in relation to the gas question for many years, and he hoped one effect would be to cause the Board of Trade to lay down some principle which would be a guide to the Legislature in their

future dealings with gas companies. One question of considerable importance, which would have to be dealt with sooner or later, was the question of amalgamation. He was much in favour of it at one time, but his confidence had been shaken as to its beneficial effect by the conduct of the companies by whom the principle had been adopted.

Mr. DRESSER ROGERS seconded the motion, which was supported by

Mr. LESLIE, in a speech strongly condemnatory of the conduct of the Chartered Gas Company, who, he again asserted, were not under the Act of 1868 in their districts outside the City. The course which should be taken by the board, under the circumstances of the case, was not to oppose the company before the Board of Trade commissioners, but to challenge the legality of their proceedings before the judges of the land.

Mr. RUNTZ said a great deal had been sometimes urged against amalgamations, but there was one kind of amalgamation which he thought would be desirable, and that was the amalgamation of all the companies, under the management of this board. It struck him that it would come to that some day, and the sooner the better for the consumers of gas.

The motion was then put and carried.

Mr. NEWTON moved—"That it be an instruction to the clerk to communicate with the several vestries and district boards, asking them to give what information they can with reference to this question."

Mr. FOWLER seconded the motion, and said that the parish of Lambeth, and indeed the whole of the districts south of London, though not affected by the proposed application for a revision of price, were gratified to learn of the intended opposition by this board.

After some remarks from Mr. RICHARDSON and General Sir WILLIAM CODRINGTON, the motion was put and carried.

A letter was read from the Westminster District Board, transmitting copy of notice received from The Gaslight and Coke Company, respecting damage that may be caused to the company's mains, &c., by the use of steam road rollers, with a view to the board taking such action in the matter as the interests of the public require. The letter was referred to the Works Committee.

CITY SEWERS COURT.—At the meeting of the commissioners, on the 16th inst., the question of the supply of gas to the public lamps was raised by the receipt of a letter from the Chartered Ctmpany, "regretting that the company cannot send any proposition stating their charge for the ensuing year for lighting the public lamps in the City. The price will be settled by the Board of Trade." The letter was referred to the Streets Committee.

The gas question was, of course, freely discussed among the small tradesmen who usually attend the City wardmotes, and seems to have been welcomed by them in the absence of more exciting topics. Resolutions were passed at some of these meetings urging the corporation to resist the proposed advance, which was declared to be "uncalled for."

ST. PANCRAS VESTRY.—At the meeting of this vestry, on Wednesday, Dec. 17th, the General Purposes Committee brought up a report upon the negotiations in which they had been engaged with the Imperial Gas Company relative to the adoption of the meter system to the public lamps. The report stated that—

The total outlay for putting the meter system into operation, according to the lowest tender, would be £2025, and according to the highest tender £2508, with (say) £100 for incidental expenses. The annual outlay for lighting, extinguishing, repairs, &c., according to the minimum tender, would be £2989, and the maximum £3881. This item includes everything now done by the Imperial Gas Company, except the supply of gas, and for which a charge is made of £3002 per annum; but it does not include the salary of an "Inspector of Lighting" (say) £150 or £200 per annum.

Your committee are therefore of opinion that the whole expense of adopting the system will not exceed £2500, and that the annual outlay for maintaining it, with the lighting and extinguishing, &c , in the hands of the vestry, will but slightly exceed the annual sum now paid to the Imperial Gas Company for the lighting, extinguishing, &c. It will be seen by reference to the former report of your committee, that it was then estimated that the cost of adopting the meter system would not exceed £3000; and it was stated that, taking the experiments then referred to as a basis, a saving of at least £3000 a year would be effected, and the same amount of light obtained, or that a light one-fifth better would be obtained without any additional cost. The further evidence laid before your committee, and the tenders now received, have confirmed your committee in the opinion that the statement then made was a correct one.

Your committee therefore recommend—1. That notice be given to the Imperial Gas Company that it is intended to commence the average meter system at the end of three months from the 31st of December next. This recommendation is of immediate importance, as the temporary contract agreed to by the vestry expires on the 31st inst., and the company desire three months notice before the meter system is adopted. 2. That authority be given to your committee, if they may think it necessary, to call in the assistance of a professional man, thoroughly acquainted with meters, governors, &c., at a cost not exceeding £30, to advise as to the merits of the several tenders, and the technical details of the form of contract to be prepared for carrying out the work. 3. That authority be given to your committee to consider the terms upon which an inspector of lighting should be appointed, the salary to be paid, and the duties to be performed.

Mr. Hoppey, in moving the adoption of the report, traced the history of the negotiations with the gas company, and of the experiments which were tried both by the company and the gas examiner of the parish. He then pointed out the advantage which would be derived from the vestry having the lighting and extinguishing of the lamps under their own control, and urged that a great saving might be effected by a proper use of the power. As to the fund which would be required at the outset, it could be borrowed, and the interest would constitute a very small charge on the parish. He did not consider, however, that there would be any necessity to borrow the money. Mr. Rule seconded the motion, and said the gas company had been very courteous throughout, but the opposition which they had managed to give the scheme was another evidence that there was something in it. The outlay would be saved on the first year's consumption of gas. The motion was carried unanimously.

HACKNEY VESTRY.—Upon the reading of the Imperial Gas Company's notice of intention to terminate existing contracts at the end of the year, and to apply to the Board of Trade for a revision of price, Mr. Runtz remarked, at the meeting on the 12th inst., that when the Metropolitan Board of Works evinced a willingness some years ago to take the supply of water and gas into their own management, the scheme was resisted by the local authorities of London, and condemned as an advance towards that dreaded thing "centralization." Perhaps the present position of affairs would induce the ratepayers to believe that their interests would have been in better keeping had they been entrusted to a representative body instead of being left in the hands of irresponsible companies. There was no doubt that a vigorous resistance would be offered to this attempt of the gas companies, and the Metropolitan Board of Works and the corporation would unite their strength to oppose the companies and support the interests of the consumers. The high price of coals should not be advanced as a reason for increasing the price of gas, for most of the companies had long contracts which were yet unexpired, and the residual products were becoming more and more valuable every day. Mr. Bowser moved a resolution approving the attitude of the Metropolitan Board of Works in the matter, and expressed a hope that ere long the gas and water supply would be placed in the hands of authorities responsible to the consumers. Mr. Green seconded the motion, which was supported by Mr. Cox and others, and subsequently agreed to unanimously.

WESTMINSTER DISTRICT BOARD OF WORKS.—At the meeting on the 12th inst., the Works and General Purposes Committee reported, with reference to a letter from Messrs. Curtis and Bedford, solicitors to the Chartered Company, forwarding a notice respecting damage caused to the company's main by the use of the steam roller, stating that, "After consulting with the solicitor to the board, the committee are of opinion it will be advisable to discontinue the use of the steam road roller for the present;" and they recommended that a copy of the notice received from the gas company be forwarded to the Metropolitan Board of Works, with a view to the board taking such action in the matter as it may consider the interests of the public require.

ST. GEORGE, HANOVER SQUARE.—At the meeting of the vestry on the 18th inst., Mr. Leslie brought forward a motion to the effect that the vestry, under the advice of counsel, should take such steps as might be deemed necessary to test the legality of the decision of the Board of Trade commissioners in April last, under which the Chartered Company have been charging an increased price for gas during the current year. He asserted that the commissioners sat in defiance of the Metropolis Gas Act, 1860, which the Court of Queen's Bench and the Exchequer Chamber had declared was still in force in the districts supplied by the company outside the City. Mr. Cremer seconded the motion, but the chairman ruled that any resolution for taking legal proceedings was out of order, and could not be put. It was then resolved that a special meeting of the vestry should be held on the 22nd inst., to consider this question. At this special meeting Mr. Leslie himself occupied the chair, and supported his proposition in a long speech. Mr. Barlow thought that the Metropolitan Board would be the proper party to take legal proceedings, but Mr. Leslie said they had no power to do it. General Sir William Codrington said he did not think that was quite the position of the Metropolitan Board. They could appear before the Board of Trade commission by counsel. The Board of Trade appointed the commission to inquire into the question of the price of gas as between the consumers and the company. He understood that the Metropolitan Board were informed by the commissioners that they only, and not the vestry, had a *locus standi* to appear. He wanted to know whether Mr. Leslie proposed that the vestry should go at once to the Court of Queen's Bench without again bringing the subject before the vestry. Mr. Leslie said beyond all question that would be the effect of the motion if counsel thought they had any case. To get the opinion of four judges would be far better than anything else they could do. Mr. F. Morris thought they should know what counsel they intended to consult. Mr. Cove hoped the vestry would pause before they embarked in a sea of litigation. The chairman stated that if it came to that he could undertake to raise the money from the injured gas consumers of the parish. Some of his friends were paying £1000 a year for gas, and of course the increased price was a very serious item to them. In all probability, if the question was to be heard on its merits, the court would grant a rule *nisi* to hear it in four or five days. An amendment was proposed by Mr. Finch, modifying the terms of the motion, which was ultimately carried.

PADDINGTON VESTRY.—At the meeting of the vestry on the 16th, a deputation of ratepayers and others attended to urge the vestry to support the Metropolitan Board in their opposition to the intended application by the Imperial Company to the Board of Trade. After hearing their statements, the vestry decided to send a deputation of their own body to the Metropolitan Board on the subject.

ST. GEORGE'S (EAST) VESTRY.—At the meeting of this vestry on the 18th, the London Gas Consumers Association applied, through their "secretary," for the use of the vestry hall to hold a public meeting of gas consumers and ratepayers in favour of the bill now before Parliament, proposing to place the supply of gas in the hands of the local authorities, in order that the profits derived from the same should be applied for the benefit of the ratepayers, as at Leeds, Manchester, and other places. Mr. Fairclough asked the vestry if it was worth while to fall into the trap set by this public agitator. The "secretary" came before the public and drew upon his imagination for his facts, for, so far from the corporations in the various towns cited by him paying for the gas used, and handing over something to the ratepayers, it was quite the contrary. The fact was that everybody in those towns had to contribute by rate towards the cost of the gas, whether consumers or not, and in his opinion it was hardly fair or right to charge the non-consumer for material used by people in business. After some discussion, a motion to grant the use of the hall for the intended meeting was negatived.

ST. PANCRAS GUARDIAN BOARD.—At the meeting of the guardians on the 18th inst., Mr. Salter moved that application be made to the Local Government Board for permission to allow the guardians to appear before the Board of Trade, by counsel, to oppose the intended application of the Imperial Gaslight and Coke Company for a revision of the price of gas. Mr. Seaton seconded the motion, which was put and carried.

KENSINGTON VESTRY.—At the meeting on the 17th inst., Dr. Dudfield reported that the average illuminating power of the gas supplied by the Chartered Company during the past month was 21·9 candles, as found by 23 testings. In thirteen of the testings sulphur was found to exist to the extent of 19·8 grains per 100 cubic feet. The excess of ammonia was 18 times over five grains and eight times over ten grains in 100 cubic feet. A trace of sulphuretted hydrogen was twice discovered. The secretary of the company had explained the above facts to be due to unavoidable causes—viz., the alterations now proceeding rapidly at the Kensal Green station. A local paper states that this vestry have decided to suspend payment of the Chartered Company's claim of £53 6s. for gas supplied, till the appeal to the Court of Queen's Bench by Major O'Brien, against the decision of Mr. Bridge, at Hammersmith Police Court, that he was liable for the increased rate of 6s. 3d. per 1000. The gas company fixed Friday, the 19th inst., as the date up to which the amount must be paid, or legal proceedings would be taken. The vestry's action was recommended by Mr. Cole, Q.C., Mr. Jordan, Mr. Wells, and other legal gentlemen, members of the vestry. The clerk was empowered to offer payment of the lesser sum.

ISLINGTON VESTRY.—At the meeting of this vestry on the 19th inst., the special committee appointed to consider the question of the intended application of the Imperial Company for a revision of the price of gas presented a provisional report, stating they had resolved that the vestry be informed that the Metropolitan Board was the authority appointed to represent the consumers when the gas question came before the Board of Trade, and that the vestry be recommended to request the Metropolitan Board of Works to oppose any increase that is not absolutely necessary, after due care and economy have been observed, to produce the statutory dividends. Mr. West said the only question was one of arithmetic, and if the Imperial Company could prove that it was necessary to raise the price in order to preserve the dividends, up it would go. It might be asked how it could be necessary to go beyond 3s. 9d. per 1000 cubic feet, when in some districts of the metropolis the price was as low as 3s. or 2s. 10d. The unfortunate feature of the case was that the Imperial Gas Company had expended vast sums of money, and their dividend was secured to them on that expenditure. All that could be done was to urge the Metropolitan Board of Works to see that there was due economy, and no unfair mode of dealing with the money. The report was adopted.

BETHNAL GREEN VESTRY.—At the meeting on the 18th inst., the clerk, to whom it was referred to consider and advise the vestry upon the notice received at the last meeting from the Commercial Gas Company of their intention to apply for powers to increase the price of gas, stated that the matter was one that would have to be contested by the Metropolitan Board of Works. The only way in which assistance of any value could be rendered would be by furnishing evidence of a scientific kind upon which the issue would mainly

depend. It was, after some conversation, resolved that the vestry express satisfaction with the determination of the Metropolitan Board to oppose the attempt of the gas companies to increase the price of gas, which attempt the vestry was of opinion was not warranted by existing circumstances.

METROPOLIS WATER SUPPLY.

The following are the returns of the Society of Medical Officers of Health relating to the composition and quality of the metropolitan waters, in December, 1873:—

Names of Water Companies.	Total Solid Matter per Gallon.	Oxygen required by Organic Matter, &c.	Nitrogen.		Hardness.	
			As Nitrates, &c.	As Ammonia.	Before Boiling.	After Boiling.
Thames Water Companies.	Grs.	Grs.	Grs.	Grs.	Degs.	Degs.
Grand Junction	20·93	0·047	0·131	0·003	16·0	3·6
West Middlesex	20·43	0·025	0·129	0·001	15·8	3·6
Southwark and Vauxhall	20·70	0·041	0·134	0·002	15·9	3·6
Chelsea	20·67	0·028	0·148	0·002	15·9	3·6
Lambeth	20·93	0·037	0·115	0·003	16·0	3·6
Other Companies.						
Kent	28·73	0·015	0·257	0·000	21·8	5·7
New River	20·33	0·022	0·147	0·000	15·6	3·5
East London	20·87	0·071	0·167	0·002	16·0	3·6

Note.—The amount of oxygen required to oxidize the organic matter, nitrites, &c., is determined by a standard solution of permanganate of potash acting for three hours; and in the case of the metropolitan waters the quantity of organic matter is about eight times the amount of oxygen required by it.

The water was found to be clear and nearly colourless in all cases but the following, when it was slightly turbid—namely, in that of the Lambeth Company. The average quantity of water supplied daily to the metropolis during the preceding month was, according to the returns of the water companies to the Association of Medical Officers of Health, 110,814,481 gallons; and the number of houses supplied was 506,792. This is at the rate of 33·0 gallons per head of the population daily. The last official return from Paris stated that the average daily supply per head of the population was 24·9 gallons; but this includes the water used for the public fountains, and for the ornamental waters in the Bois de Vincennes and the Bois de Boulogne. Hy. Letheby, M.B.

Major Bolton's report on the water supplied by the metropolis water companies states that during the month of November the state of the river at Hampton, Molesey, and Sunbury, where the intakes of the West Middlesex, Grand Junction, Southwark and Vauxhall, Lambeth, and East London Companies are situated, was good on the 1st, after which it gradually became slightly coloured and turbid, and remained more or less in this condition until the 13th, when it improved and became good for the remainder of the month. The highest flood state of the river at Hampton during the month was 11 inches above the (6 feet) summer level, and the lowest 4 inches below. At Ditton the state of the water in the river during the month was good for nine days, indifferent for eight days, and bad for thirteen days. The highest state of the flood water at this place was 1 foot 5 inches, and the lowest 2 inches above summer level. The highest temperature of the water during the month was 48°, and the lowest 42°, while the highest temperature of the air at the same place was 60°, and the lowest 30°. These observations were made daily at 9 a.m. The rainfall during the month was 1·89 inches.

East London Water Supply.—Mr. John Liddle, the medical officer of health for Whitechapel, reporting on the sanitary condition of that district, writes that during the past year five additional water-waste preventers have been erected. There are now 188 water-waste preventers in this district, and the number of butts is becoming gradually reduced. He expresses himself at a loss to conceive why the use of water-waste preventers is not made universal in the poor neighbourhoods. These machines appear to him to be as beneficial to the water companies as they are serviceable to the poor. The water-waste preventers are not now entirely confined to the poorest class of houses, but they are being extended to private houses. There is a great variety of water-waste preventers now in use; and a new one, which appears to be approved of by the New River Company, is being introduced, the machinery of which is very simple, and the cost of the apparatus (which is known as Lambert's Patent Water-Waste Preventer Bib Tap) is comparatively small, about 7s. 6d. each. Mr. Samuel Blow, of Swan Street, Minories, plumber, has erected four of these bib taps in the district.

MALTA AND MEDITERRANEAN GAS COMPANY, LIMITED.

An Extraordinary General Meeting of this Company was held at the London Tavern on Monday, Dec. 15—Lord A. Hervey in the chair—to take into consideration the financial position of the company, and a proposition by the directors to raise additional capital.

The Secretary (Mr. Rowsell) having read the notice convening the meeting,

The Chairman said he believed it was no secret that for a long time the company had been suffering from a want of capital, to the great inconvenience of the directors, and to the injury of the undertaking generally. On referring to the last published accounts this would be seen at once. It there appeared that the "bills payable" amounted to £3732, which, deducting "bills receivable," £1150, left a liability of £2582 on that head. There was also an item of "sundry creditors," £1777; due to "reserve fund," £1192; and "general revenue," £3891; making together £9449. To this must be added debentures paid off since the last meeting, £2000, making very nearly £12,000 in all. In addition to this the directors required capital with which to carry on the affairs of the company. In the course of the next two years they would require about £5000 for new works which could not be dispensed with. This made a total requirement of something like £17,000. The way to provide this sum had occupied the serious attention of the directors, and various plans had been proposed. It had occurred to some gentlemen that the directors might try to issue debenture stock, but on taking the best advice they could procure it was found that there were legal and technical objections to this course. The issue of ordinary shares at great discount had been suggested, but in the present state of the money market it was felt that this was nearly impracticable. Another course, and one recommended by some of the largest and most experienced shareholders, was that which the directors had resolved to bring before the meeting—viz., the issue of 7½ per cent. preference stock to the extent of £40,000. The actual requirements of the company, as he had stated, were £15,000, and the reason why it was intended to ask for power to create £40,000 worth of shares was that it would enable the board in the future to issue their debentures at a lower rate of interest. At the present time the debentures of the company bore so large a proportion to the ordinary stock that the latter was very much depreciated. If the directors could pay off, say, £30,000 of debentures it would enhance its value very considerably. Of the money now to be raised, £10,000 would be for working capital, £5000 for new works within the next two years, and £30,000 for paying off debentures, leaving a margin of £5000 to put the company in a safe position and provide against future contingencies. The shareholders would naturally wish to know what estimate had been formed of the means to meet the additional charge thus brought against the company. Of course it was difficult to calculate exactly, because it was not possible to tell how many debenture-holders would ask to have their money paid off. But supposing the whole £40,000 to be called up, the charge would be as follows:—For the £5000 required for additional works the whole of the interest must be provided, £375. As to the £10,000 for working capital, he estimated the interest as being only 1½ per cent. beyond the interest now paid in various ways for money employed for the purpose—amounting to £150—total, £525. If the whole of the £20,000 of debentures were paid off, the difference between the dividend on the preference shares and the debentures being only ½ per cent., it would require another £100, making the total charge £625. As to the means of meeting this charge, the margin of revenue seemed ample. That margin, it was true, might be somewhat reduced by the high price of coals, but as regards the coal market, he thought the company had seen its worst state, and that instead of their profits diminishing, they would see a better balance to credit than had hitherto been the case. Believing in the perfect security of the new shares, he concluded by proposing—"That the capital of the company be increased from £105,000, divided into 5000 shares of £5 each, to £145,000, divided into 29,000 shares of £5 each, by the creation of 8000 shares of £5 each.

Mr. H. P. Stephenson seconded the motion, believing that the proposal was the only one likely to find favour with the shareholders, and the only one that would help the company out of the financial difficulties in which they were placed. Those difficulties were not attributable to the abnormal state of the coal market, but to the past impolicy of the directors in spotting their works about the Mediterranean in places which would never yield a proper return for the money invested. He for one would not now give his assent to an increase in the capital if he did not know that the board had been strengthened by the appointment of a highly practical man—Mr. Paddon, of Hove—as a director. With that gentleman on the board, he believed the policy of the past would not be repeated. He hoped that if the scheme now proposed was carried, and the minds of the directors relieved from the anxiety incident to their financial difficulties, they would be able to give undivided attention to the working of the concern, and especially the Malta station, the profits of which hitherto had been diluted by the losses at Marsala and Trapani.

Mr. Peill objected to the creation of so large an amount of new capital, unless it was understood that as the debentures became due they would be taken up, and not renewed. He doubted also whether the board would succeed in placing this stock at so small an additional dividend beyond the interest on debentures. As to the two stations referred to by Mr. Stephenson, which he understood were worked at a loss, he desired some further information from the directors. He also asked for particulars respecting the company's coal contracts and other matters connected with the past year's operations.

The Chairman said these inquiries could be better answered at the office of the company than at a meeting like this. As to the Sicilian stations, no doubt they had proved a disappointment. He was no party to their acquisition, and should never have consented to the arrangements in reference to them; but he thought they might even yet turn out better than they had been. As to the debenture-holders, it was impossible to say what they might do. Some, perhaps, would like to be paid off; others might be willing to renew, and with the new capital to fall back upon would possibly renew at 6 per cent. With respect to coals, he might mention that the company had a contract for 4000 tons of Pelaw Main at 17s. 6d.

Mr. H. M'L. Backler said he quite agreed in the principle of the resolution, but thought it scarcely went far enough. For several reasons he felt it would be better to issue 10,500 preference shares than 8000. In the first place, the directors could then allot one preference share to the holders of every two ordinary shares, which would be an easy mode of allotment. Then, again, the liabilities of the company, as they appeared to him when he recently had an interview with some members of the board, were £10,500. If they issued 10,500 shares, and called up £1 on each, these liabilities would be swept away, and the directors would be in a position to make purchases without asking for credit. One of the great errors of the company in the past was the tinkering with the capital, and it was desirable now to carry out a comprehensive scheme which should settle the question for some time to come. He confessed that he looked with much suspicion on the statement made by the chairman that it was intended in the next two years to lay out £5000 on new works. Fresh outlays, in this company, were matters which should be specially avoided; on the contrary, if the directors could by any means contrive to get rid of their unproductive stations, so as to reduce the capital, it would be most desirable.

Mr. Lambert hoped there would be a condition attached to the resolution, that the new shares should not be issued below par. He thought the plan adopted by the Bahia Company, of issuing 10 per cent. redeemable shares would have been better than that now proposed.

The Chairman said the proposal made by the directors was the result of their conference with some of the principal shareholders.

Mr. Paddon said a very proper question had been asked as to the means of the company to meet the charges involved in this increase of capital. It might be taken for granted that the matter had not escaped the attention of the directors. First of all, he thought they were entitled to expect some saving from being able to conduct their business by means of a sufficient working capital. At present, the working capital was almost entirely provided on the personal credit of the directors, and at some considerable expense. Then, again, there was the sum to be received above that of last year from the increased price of gas. As far as the payment of the interest on the new shares was concerned, there was £2250 available at the worst times to pay a charge at the outside of £1500, and this was leaving out altogether one important matter—viz., the probable reduction in the price of coal. Reference had been made to the money wanted for the purposes of extension. It must be remembered that the business of the company was increasing, and if it was to be done profitably, capital to meet this increase must be provided. The board were committed to a portion of this expenditure already, but they wished it to be most distinctly understood that any further extensions would be looked at in the most careful way, and only entered upon when satisfactory proof was given that it would be to the immediate, direct, and not speculative, advantage of the company.

A Shareholder said he thought the company ought at once to get rid of the Marsala and Trapani stations, and confine their operations to Malta and Corfu.

The Chairman said the directors were entirely of the same opinion, but the municipalities of the two first-named places, who were the only parties to purchase the works, had no funds for the purpose.

After some further conversation,

Mr. Backler, having elicited from the chairman that it was not intended to call up a larger amount on the new shares than was absolutely necessary from time to time, withdrew his suggestion, the reason for making it being, as he said, his conviction that there would be little chance of re-issuing debentures unless there was an amount of uncalled capital as security for the debenture-holders.

The motion was then put and carried. Resolutions were also adopted for giving a preference dividend of 7½ per cent. to the new shares, and authorizing

the directors to offer the same in the first instance to the existing shareholders *pro ratâ*, and to dispose of the unaccepted shares at such times and in such proportions as they might think fit, a provision being added, on the suggestion of the meeting, that no shares should be issued below par.

A vote of thanks was then given to the chairman, and the proceedings terminated.

BOMBAY GAS COMPANY, LIMITED.

The Half-Yearly Meeting was held at the Terminus Hotel, Cannon Street, London, on Thursday, Dec. 18—D. T. Evans, Esq., in the chair.

The Secretary (Mr. Marshall) read the notice convening the meeting, and the following statements of account were presented:—

Your directors have pleasure in submitting to the shareholders a statement of accounts, duly audited, for the half year ending the 30th of June last. During this interval the profits of the company have increased; it is now doing well, and its prospects are hopeful and assuring. Your directors, having laid in a large stock of coal before the rise in price, have been enabled to continue to supply gas of excellent quality to the community of Bombay without increased charge. The accounts show a net profit for the half year of £10,793 19s. 11d.; and, after appropriating £1500 to the reserve-fund, your directors declare an interim dividend, free of income-tax, at the rate of 7 per cent. per annum (as against a dividend at the rate of 6½ per cent. per annum at the corresponding period of last year), leaving a balance of £958 19s. 11d. to be carried to the credit of the current half year. The dividend will be payable on and after Jan. 1, 1874.

Dr. *General Balance Sheet, June* 30, 1873. *Cr.*

To Capital authorized:—				By Construction account	£198,415	2 3
(50,000 shares, at £5 each—£250,000.)				Goods *in transitu*	190	14 10
40,000 shares, £5 paid	£200,000	0 0		Services account	174	0 9
10,000 „ £4 paid	40,000	0 0		Retort account	754	2 1
Debentures	19,750	0 0		Stock in trade, viz.:—		
Amount owing by company	1,492	10 3		Chandeliers, brackets, &c.	7,088	6 5
Dividend	9,000	0 0		Brass and iron goods, tubing, &c.	8,747	10 0
Reserve-fund £5,726 16 3				Materials, mains, and services	2,012	4 7
Added this half year 1,500 0 0				Meters	3,158	11 2
	£7,226	16 3		Coal	10,774	1 5
Writ. off chandeliers, meters, tools, &c. 2,906 10 3				Coke	60	8 5
	4,320	6 0		Tar	285	2 8
Insurance-fund	422	13 8		Oxide, tools, fire materials, &c.	1,320	16 1
Passage-fund	100	0 0		Amount owing to the company	6,020	19 10
Balance to general revenue	9,358	19 11		Cash at bankers, on deposit, and in hand	27,942	9 4
				Bankers bills in hand	17,500	0 0
	£284,444	9 10			£284,444	9 10

Dr. *Profit and Loss Account for Half Year ending June* 30, 1873. *Cr.*

Coal carbonized	£6,828	7 9		Gas and meter rental	£18,856	4 1
Wages	1,253	7 0		Coke	4,098	2 9
Purifying	44	12 0		Tar	116	4 2
Maintenance of retorts	219	16 5		Fittings	379	8 5
Trade and general charges	965	7 6		Transfer fees	10	9 6
Salaries and collectors commission	1,778	4 2				
Rent, rates, and taxes	426	3 10				
Directors and auditors remuneration	651	5 0				
Bad debts and allowances	89	12 2				
Exchange and interest	424	13 2				
Net profit	10,793	19 11				
	£23,466	8 11			£23,466	8 1

Dr. *General Revenue Account, June* 30, 1873. *Cr.*

Dividend for half year ending the 31st of Dec., 1872	£9,000	0 0		Balance on 31st of Dec., 1872	£9,657	10 0
Interest on debentures	592	10 0		Net profit for half year ending June 30, 1873	10,793	19 11
Amount carried to reserve-fund	1,500	0 0				
Balance carried down	9,358	19 11				
	£20,451	9 11			£20,451	9 11
				1873, July 1.—By Balance brought down	£9,358	19 11

The Chairman said it gave the directors great pleasure to meet the shareholders on this occasion, when they had the privilege of offering them a larger dividend than had hitherto at any half-yearly meeting been declared. That dividend, he could assure them, had been well earned, and there was a fair prospect of its being continued in the future, and even improved. In the accounts now laid before the meeting, it would be found that the gas and meter rental showed a falling off of £700. This was chiefly owing to the economies by the Municipality, and partly to the absence of the governor from Bombay during a great portion of the year, during which fewer lights were used in Government House and buildings, &c. This diminution of rental had been nearly compensated by the decrease in the leakage, which amounted in the half year to more than one million cubic feet. The coal carbonized amounted to £300 less than at the corresponding period of last year. Coke, which was a very material element in the profits of the company, showed a large increase, amounting to £1456 upon the corresponding half of last year. He was happy to state that this increase continued, and would be maintained in the current half year. Tar showed a slight decrease, which was due to the discovery of a deficiency in store, owing to a mistake in the measurement of the quantity in the tanks. Fittings, on which for a long while there had been a loss, at length showed a profit, amounting to £379. The items on the expenditure side of the account showed a decrease of £512 in the past half year; the income, on the other hand, was increased by nearly £1000, and these two sums accounted materially for the satisfactory state of the company's affairs. With regard to the working in the current half year, there was not one unfavourable feature, so far as the returns, up to the end of October, had reached the board. On the contrary, the expenditure, under all heads, was less; there was less coal carbonized; the leakage was less; the fuel used was less; the fittings still showed improvement, and the Manager reported that at the present moment he was very busy. The coke sales were good, there was no stock in hand—all had been sold at a high price. Some had been disposed of at £3. 6s. per ton, and the average was about £3, which was most satisfactory. The private consumption had given the board some little anxiety, but he thought they had now "turned the corner," and that there would be an improvement in this direction. The Municipality had made application to the Manager for a calculation of the cost of a very considerable extension of the public lighting; and, though the matter was not quite concluded, it had proceeded so far as to enable him to say that it would be concluded on terms satisfactory to the company. With regard to coal, he might state that up to the present time they had been putting coal into the works at an average of 10s. a ton increase—*i.e.*, about 50s. a ton; but, when the enhanced value of coke was borne in mind, it would be seen that there was nothing to fear on that point. The directors were doing their best to get cheap freights, and gas coal had gone down considerably in price. That which was 23s. had gone down to 16s. The Manager was about to try a cargo of East Indian coal, of the same kind as the Oriental Company used, and if that could be worked with fair results in Bombay, it would be of great service to them. With these remarks, he moved the adoption of the report.

Mr. Stokes seconded the motion.

Mr. Morrison congratulated the Directors on the very gratifying state of affairs they were able to report, and said he understood that they had sufficient coal in hand for the next four months.

The Chairman said they had coal in store, ordered, and afloat, sufficient to last for the whole of next year.

Mr. H. P. Stephenson said the Chairman had remarked, in reference to the proposed extension of the public lighting, that the contract would be satisfactory to the company. He might also have added that it would be satisfactory to the Municipality, who would have a large portion of the necessary mains laid for them free of cost, instead of having, as in the past, to pay a portion of the expense thereby incurred. No doubt the finances of the company were in a highly satisfactory state, and he hoped the Directors would be able to make arrangements with the money in hand to pay off some portion of the bonded debt. There was one point in regard to the future which he looked upon with great pleasure, and that was that the works of the company were now capable of manufacturing at least 60 per cent. more gas than was required at present.

Mr. Linging asked what was the amount of the leakage.

The Chairman: About 7½ per cent.

Mr. Linging said there was no distinction made in the accounts between the receipts for public and private rental. The latter he apprehended was considerably smaller than the former.

The Chairman said it was smaller, but not considerably. He was happy to say it was improving.

Mr. Linging said it was a healthy sign that the Directors were able to write off so much on the chandeliers and fittings account, and to know that, when these writings off came to an end, the profits of the company would be augmented considerably.

The Chairman said there had been some £3000 or £4000 a year written off the fittings account for some time. With sales and writings off altogether the stock of fittings stood at £20,000 less than they did eight years ago. They were approaching the time when they would have but little or nothing more to write off the fittings account.

Mr. Linging asked whether the stock of fittings was an actual asset for the £7000, at which it now stood in the company's books.

The Chairman said he believed that sum represented the *bonâ fide* value of the stock.

Mr. Stephenson said, in his opinion, the £7000 was beyond the value of the stock, and that from time to time, as the profits allowed, the board would still have to write something off.

Major Suart said the misfortune was that, having this stock on hand, they were frequently obliged to purchase and send out new fittings.

A Shareholder said there was a charge of £374 for interest.

The Chairman said that was for interest and loss on exchange. They had had till within the last month or so a sum of £42,000 lying in Bombay, which they could not bring over without incurring a very considerable loss. They were allowed 2 per cent. upon their drawing account, and about 4 per cent. upon their deposit account with the bankers there. The first of their debentures fell due in January, 1875, but, inasmuch as the company had plenty of money in hand, if any debenture holder thought he could do better with his money, they would be happy to pay him off at par.

The motion was then put, and carried.

On the motion of Mr. Linging, seconded by Mr. Stokes, thanks were voted to the Chairman and Directors; and, on the motion of Mr. Morrison, a vote of thanks was given to the Secretary, and the Manager, in Bombay, for their services.

Liverpool Water Supply.—The bill of which the corporation of Liverpool has given notice for regulating the supply of water, and checking the enormous waste continually reported, has been lost by a majority of one in the Town Council. It came on for discussion on the 17th inst., and the chairman of the Water Committee, Mr. Wilson, introduced the debate by explaining the objects and the necessity of the bill. The object, he said, was simply to obtain for the Corporation of Liverpool the same powers which had been obtained by the water companies of the cities of London and Norwich, and possessed by the city of Manchester, the boroughs of Leeds and Bradford, and other places—in fact, in sending round a circular to obtain support to a general Act, the town-clerk found virtually that almost every place except Liverpool possessed those powers. If the powers were obtained, the effect would be to substitute a constant service of water for the present intermittent service, which would enable the town to go on until a scheme for an additional supply was brought forward, and which would save the ratepayers £20,000 per annum. To show how beneficial the results would be, Mr. Wilson alluded to the case of Norwich, where, since the system which was proposed to be carried out in Liverpool had been adopted, the water supply had been reduced from 40 gallons per head under the intermittent service to 14 gallons per head under the constant service with better fittings. The citizens of Norwich were so satisfied with the benefits they had received from the change that there were no complaints as to the expense of the fittings. A constant service was necessary for health, and would be very beneficial for Liverpool. Recent experience in certain districts in Liverpool showed that, whereas under the old system 19 gallons per head were required, they were now getting down to 12 gallons per head, being a saving of 7 gallons per head. Fourteen districts of the town had been placed under meter service, and the experiment had turned out a great success, and had given them complete control over the supply, so that in some of the districts they could even tell where a tap had been left on all night. The only thing was that it involved an enormous expenditure, as each meter cost about £80; but Mr. Deacon, the borough engineer, had invented a meter which would enable them, at a cost of £2400, to put the whole of the meters down which were required. After some conversation, the several clauses of the bill were passed, and the preamble was also agreed to by 32 votes against six. The Municipal Corporations (Borough Funds) Act requires the sanction of an absolute majority of a Town Council to a parliamentary bill. There are 64 members in the Liverpool council; and, consequently, at least 33 votes are required to form an absolute majority. The bill is, therefore, lost for the coming session. At the meeting of the Water Committee on the 16th inst., the chairman, in reference to the alterations being made in the supply of water to the town, explained that there were now something like 50 districts under constant service, the committee were supplying water within the borough to about 90,000 people, and they were commencing with a second service of twelve districts. He thought that the work would still occupy two years. Mr. Hughes inquired what would probably be the aggregate saving when the whole scheme is completed? The chairman said there was no doubt that it would be £20,000 per annum at least. At the police-court, on the 13th inst., Mr. Moorhouse, deputy town-clerk, appeared in support of informations against the following persons for allowing a waste of water on premises of which they are owners:—Robert Bradshaw, 20, Rothwell Street, total waste 3850 gallons, fined 40s. and costs; J. Harrison (tenant), 59, Everton Brow, 1620 gallons waste, 10s. and costs; James Robinson, 27, Shaw's Alley, 5400 gallons waste, 40s. and costs; Hugh and John Twiss, 46, Lydiate Street, 2340 gallons waste, 20s. and costs; Edward Jones, 40, Liffey Street, 2610 gallons waste, 40s. and costs; Thomas Wynne, 42, Thames Street, 5700 gallons waste, 40s. and costs; Charles Mitchell, 15, Thames Street, total waste 17,920 gallons, fined 60s. and costs. Mr. Deacon, the borough and water engineer, has recently submitted to the committee a report on the prevention of waste of water, restoration of constant service and waste water meters, to which in our next we hope to refer at length.

MANCHESTER CORPORATION GAS-WORKS.

Report of the Gas Committee for the Year ending June 24, 1873.

The Gas Committee present the following report for the year ending June 24, 1873:—

Your committee submit an abstract of the accounts of this department for the year, and also the usual tabular statements.

Appendix A shows the amount of lamp and private rental derived from the townships within and beyond the city respectively, for the past two years.

Appendix B, the quantity of gas transmitted from the works in the daytime, and during the whole 24 hours of the day in each month, for the same period.

Appendix C, the number of meters in use on the 24th of June, 1872 and 1873, respectively.

Appendix D, the main-pipes laid to the 24th of June, 1872, and those laid and taken up during the year ending the 24th of June, 1873.

Appendix E, the amount of profit, and the mode of its appropriation; the amount of borrowed money owing, and the excess of assets, &c., in each year from 1862 to the 24th of June last.

The rental for the past year (including meter-rents) has amounted to the sum of £272,760 7s. 10d., being an increase of £26,870 16s. 10d. upon that of the previous year; £10,352 15s. 6d. of which has been derived from the increased price to private consumers since the 29th of September last, and £970 17s. 6d. from the advance for the supply of gas to the public lamps within the city from the 25th of December last.

The amount of profit is £63,603 0s. 6d., as against £63,257 9s. 7d. in the previous year, and is appropriated as follows:—Interest, £18,413 7s. 1d.; transferred to capital account towards liquidation of the mortgage debt, £28,588 19s. 6d.; surplus to be paid over for improvement purposes, £16,600 13s. 11d.

In addition to £16,600 13s. 11d., the amount of the surplus profit, the further sum of £16,641 11s. 6d. will, in accordance with the arrangement sanctioned by the council on the 4th day of March, 1868, be paid over for improvement purposes, in anticipation of future profits, making together the sum of £33,242 5s. 5d.

The number of consumers has increased 4·57 per cent., amounting now to 64,298, as against 61,479 the previous year.

The quantity of gas supplied has exceeded that of the previous year by 98,192,000 cubic feet, or 5·76 per cent.

Your committee also submit the reports of Mr. John Leigh, the consulting and analytical chemist to this department, and Mr. George Nesbitt, the accountant appointed by the council to audit the accounts for the past year.

"Office of Health Department, Town Hall, Manchester, Sept. 24, 1873.

"To the Chairman of the Manchester Gas Committee.

"Sir,—I have the honour to report to you that the average illuminating power of the Manchester gas during the past year has been equal to that of 20·14 candles, differing from that of the preceding year by 4-100ths of a candle only.

"The gas has been tested photometrically at the Gaythorn and at the Rochdale Road stations almost daily. The standard of comparison adopted has been the light of a London standard sperm candle burning at the rate of 120 grains per hour, the consumption of the gas having been reduced to 5 cubic feet per hour.

"The gas has been tested daily for sulphuretted hydrogen and for ammonia. It has also been allowed to flow continuously through test solutions, and the amount of impurity in large volumes of the gas has been determined. As the gas has passed through these solutions during each night, and during Sundays as well as on ordinary days, any negligence in purification at these times would be detected.

"To the daily tests it has very rarely yielded any traces of sulphuretted hydrogen. From the larger volumes tested (from 100 to 600 cubic feet) rarely has more than a small fraction of a grain of sulphuretted hydrogen been separated.

"The quantity of ammonia in the gas has ranged between 2-10ths and 6-10ths of a grain in 100 cubic feet. Frequently the quantity has been inappreciable.

"The gas has been generally free from naphthaline and from oily and tarry matter.

"The quantity of sulphur existing in the gas, in combination with carbon as bisulphide of carbon and organic sulphur, has been very variable. It has, however, seldom exceeded 26 grains in 100 feet of gas. The general range has been between 15 grains and 19 grains. Attempts have been made during the past two years to reduce this amount considerably. An extension of the means employed is expected to produce a permanent reduction.

"I have the honour to be, sir, yours respectfully,

(Signed) "John Leigh, M.R.C.S., &c."

"11, *Cross Street, Manchester, Sept.* 24, 1873.

"To the Gas Committee of the Corporation of Manchester.

"Gentlemen,—I have completed the audit of the books and accounts of your gas department, including your station at Droylsden, for the year ending June 24, 1873.

"The collectors' statements of cash received, the Finance Committee's authorizations for cash payments, and the vouchers relating thereto, have been carefully examined; the bank pass-book has been compared with the cash-book and, the postings to the several ledgers, and each separate account therein, carefully checked.

"I have also examined the mortgage register, the profit and loss accounts, statements of income and expenditure on capital and revenue accounts, the schedules of liabilities and assets, and the general balance-sheet. It gives me much pleasure to certify that the accounts for the year are correct.

"Allow me to remain, very faithfully yours,

(Signed) "Geo. Nesbitt, F.M.I.A."

The expenditure on capital account during the past year has amounted to £29,832 1s., particulars of which are given in the general summary of receipts and expenditure, and the statement of assets and liabilities.

The Price of Gas.

Your committee have carefully considered the present financial position of this department in relation to the advances which have been made to the Improvement Committee in anticipation of future profits, and having regard also to the increased cost of materials and labour in connexion with the manufacture, as compared with previous years, recommend that from and after the 29th of September inst. the price of gas be advanced 5d. per 1000 cubic feet.

By such advance, it is estimated that the gas-rental for the year will be increased by the sum of £30,000 or thereabouts; but, notwithstanding, your committee are of opinion that they will still be unable to realize 10 per cent. on the capital employed, as required by the council; and, consequently, no provision is thereby made for repayment of any portion of the advances which have been made to the Improvement Committee in anticipation of future profits, which advances now amount to £52,126 8s. 8d.

On behalf of the Gas Committee,

John King, Jun., Chairman.

Gas Offices, Albert Chambers, Albert Square, Sept. 26, 1873.

Profit and Loss Account, for the Year ending June 24, 1873.

Dr.				*Cr.*			
To Cannel			£162,104 11 7	By Gas-rental—			
Retort men's wages			25,560 16 0	Within the city—			
Retorts, materials, and setting			6,945 7 7	Private consumers	£197,549 18 10		
Purifying charges			4,414 9 4	Meter-rents	4,053 9 1		
Labourers wages, and repairs, &c., of works—				Public lamps	10,732 7 3		
Gaythorn station	£7,324 6 6					£212,335 15 2	
Rochdale Road station	8,243 11 11			Beyond the city—			
Street-mains	5,561 11 9			Private consumers	£55,643 2 2		
Droylsden works	194 3 9			Meter-rents	1,069 15 9		
		21,323 13 11		Public lamps	3,711 14 9		
Salaries		9,322 19 10				60,424 12 8	
Collectors poundage, &c.		4,620 14 4					£272,760 7 10
Chief and other rents and rates, &c.—				Coke		38,812 18 4	
Chief rents	£372 11 0			Tar		12,687 16 6	
Rates and rent of offices	721 6 4			Ammonia water		7,071 13 3	
Rates on stations and street-mains	5,084 4 3						
		6,178 1 7					
Income-tax		1,089 11 8					
Amount transferred to capital account for depreciation of works—							
Gaythorn station—							
4 p. ct. on buildings (£76,326 15s. 3d.)	£3,053 1 4						
5 p. ct. on apparatus (£45,860 3s. 5d.)	2,293 0 2						
	£5,346 1 6						
Rochdale Road station—							
4 p. ct. on buildings (£113,784 2s. 1d.)	£4,551 7 3						
5 p. ct. on apparatus (£65,211 13s. 5d.)	3,260 11 8						
	7,811 18 11						
Droylsden works—							
4 p. ct. on buildings (£7075 12s. 5d.)	£283 0 5						
5 p. ct. on apparatus (£7451 19s. 10d.)	372 11 11						
2½ p. ct. on main-pipes (£2649 11s. 4d.)	66 4 9						
10 p. ct. on meters and service-pipes (£779 5s. 7d.)	77 18 6						
	799 15 7						
Street-mains store (Poland Street)—							
4 p. ct. on buildings (£1652 9s. 1d.)	£66 1 11						
5 p. ct. on apparatus (£425 0s. 5d.)	21 5 0						
	87 6 11						
Street-mains—							
2½ per cent. on main-pipes (£221,673 3s. 3d.)	5,541 16 7						
Hired meters and fittings—							
10 per cent. on £30,200 7s. 6d.	3,020 0 9						
Meter-proving apparatus—							
10 per cent. on £79 3s. 0d.	7 18 3						
		22,614 18 6					
Stationery and advertising		594 13 5					
Law stationery, receipt, postage, and deed stamps, &c.		313 19 11					
Clothing for inspectors, &c.		267 14 6					
Subscriptions to Infirmary, Eye Hospital, &c.		80 16 3					
Repairs of hired meters		235 4 4					
Miscellaneous expenses		499 4 10					
Commission, &c., charged by bankers		815 1 5					
Bad debts		747 16 5					
Balance carried down		63,603 0 6					
		£331,332 15 11				£331,332 15 11	
Interest on loans, &c. (less income-tax)		£18,413 7 1		By balance brought down, being gross profit on the year's working		£63,603 0 6	
Amount transferred to capital account, towards liquidation of mortgage debt		28,588 19 6					
Surplus payable to the improvement department		16,600 13 11					
		£63,603 0 6				£63,603 0 6	

General Summary of Receipts and Expenditure on Capital and Revenue Account, June 24, 1873.

Dr.			*Cr.*			
To Balance in the bank, June 24, 1872	£31,140 8 4		By Loans repaid		£26,066 10 7	
Ditto in the treasurer's hands, June 24, 1872	262 5 10		Improvement and Chorlton-upon-Medlock Committees—			
Ditto of sums owing to and by the committee, including stocks on hand, June 24, 1872	52,753 5 4		Surplus for the year ending June 24, 1873	£16,911 14 3		
	£84,155 19 6		Advanced in anticipation of future profits	13,293 10 3		
Balance of profit and loss account, as per statement	16,600 13 11				30,205 4 5	
Loans received	27,113 12 2		Expenditure on capital account, viz.—			
Materials sold (capital account) as per statement	50 18 0		Gaythorn station	£8,112 6 7		
Amount transferred from revenue account—			Rochdale Road ditto	9,511 0 6		
For depreciation of works	22,614 18 6		Droylsden works	180 19 9		
Liquidation of mortgage debt	28,588 19 6		Street-mains	5,066 17 0		
			Service-pipes (one moiety)	1,003 15 0		
			Hired meters	5,957 2 2		
					29,832 1 0	
			Balance in the bank, June 24, 1873	£24,198 17 3		
			Ditto in the treasurer's hands, June 24, 1873	134 3 6		
					24,332 0 9	
			Ditto of sums owing to and by the committee, including stocks on hand, June 24, 1873		68,688 4 10	
	£179,125 1 7				£179,125 1 7	

Statement of Assets and Liabilities, June 24, 1873.

PERMANENT ASSETS.

Lower King Street station—			
Land (now let to the Watch Committee, at the annual rent of £300)			£7,500 0 0
Gaythorn station—			
Land, buildings, and apparatus, as per last report—			
Land	£55,435 6 10		
Buildings	76,326 15 3		
Apparatus	45,860 3 5		
	£177,622 5 6		
Less—			
Materials sold	36 0 0		
Depreciation	5,346 1 6		
	5,382 1 6		
	£172,240 4 0		
One year's outlay to June 24, 1873—			
Land	5,032 10 0		
Condensers	513 8 1		
Scrubbers	897 12 7		
Cannel shoots	970 13 7		
Tar, &c., cisterns	698 2 4		
	8,112 6 7		
			180,352 10 7
Rochdale Road station—			
Land, buildings, and apparatus, as per last report—			
Land	£26,796 3 1		
Buildings	113,784 2 1		
Apparatus	65,211 13 5		
	£205,791 18 7		
Less—			
Materials sold	7,811 18 11		
Depreciation	9 12 0		
	7,821 10 11		
	£197,970 7 8		
One year's outlay to June 24, 1873—			
Yard-mains	£39 16 3		
New purifying-house	61 10 11		
New engine and exhauster house	426 2 3		
New cannel-store	12 15 9		
No. 3 retort-house	3,232 10 2		
New sulphur apparatus	192 0 6		
Revivifying shed and tar-well	4,610 18 5		
Breeze and tar fuel machine	146 2 3		
New meter-house	2 3 9		
No. 5 gasholder	428 16 2		
Newtown tanks	184 1 2		
Ditto gasholders	144 4 11		
	9,511 0 6		
			207,481 8 2
Droylsden works—			
Buildings and apparatus, as per last report—			
Buildings	£7,075 12 5		
Apparatus	10,880 16 9		
	£17,956 9 2		
Less—			
Materials sold	5 6 0		
Depreciation	799 15 7		
	805 1 7		
	£17,151 7 7		
One year's outlay to June 24, 1873—			
Apparatus	£33 17 6		
Main-pipes	83 2 5		
Service-pipes	63 19 10		
	180 19 9		
			17,332 7 4
Bradford Road—			
Land purchased, as per last report			30,251 18 0
Street-mains store (Poland Street)—			
Land, buildings, and apparatus, as per last report—			
Land	£1,406 0 0		
Buildings	1,652 9 1		
Apparatus	425 0 5		
	£3,483 9 6		
Less—			
Depreciation	87 6 11		
			3,396 2 7
Street-mains—			
Main-pipes, as per last report	£221,673 3 3		
Less—			
Depreciation	5,541 16 7		
	£216,131 6 8		
One year's outlay to June 24, 1873	5,066 17 0		
			221,198 3 8
Service-pipes—			
Service-pipes laid, as per last report		£19,067 10 4	
Moiety of year's outlay charged to capital account		1,003 15 0	
			20,071 5 4
Hired meters, &c.—			
Outlay, as per last report	£30,260 7 6		
Less—			
Depreciation	3,020 0 9		
	£27,180 6 9		
One year's outlay to June 24, 1873	5,957 2 2		
			33,137 8 11
Meter-proving apparatus—			
Outlay, as per last report		£79 3 0	
Less—			
Depreciation		7 18 3	
			71 4 9
Total amount of permanent assets			£720,792 9 4

FLOATING ASSETS.

Cannel, retorts, and other materials on hand—			
Revenue account		£55,515 9 0	
Gas-rents, and sundry accounts due to the committee—			
Revenue account		56,854 17 10	
Extension ditto		906 6 4	
Amount paid in advance to the improvement department, in anticipation of future profits		35,484 17 2	
Balance in the bank		24,198 17 3	
Ditto in the treasurer's hands		134 3 6	
			173,094 11 1
			£893,887 0 5
Excess of assets, June 24, 1873			£700,307 7 2
Ditto of assets, June 24, 1872			341,718 7 8
Increase, being the amount charged upon the profits for the past year towards liquidation of the mortgage debt, and carried to capital			£28,588 19 6

LIABILITIES.

Mortgage debt—			
Act of 1844—1st charge	£96,196 0 9		
Ditto—2nd ditto	29,066 10 6		
Ditto of 1854	40,610 0 0		
Ditto of 1858	94,702 10 0		
Ditto of 1867	184,315 9 9		
Total amount secured by mortgage		£444,890 11 0	
Sums advanced, not secured by mortgage at this date—			
Water-Works Committee	£10,000 0 0		
Indian Relief Fund Committee	4,000 0 0		
Sundry persons	1,250 0 0		
Admiral Duff's Charity	500 0 0		
	15,750 0 0		
			£460,640 11 0
Purchase of land, the purchase-money being left in the hands of the committee, at interest			1,750 0 0
Sundry accounts owing—			
Revenue account		£25,654 12 7	
Extension ditto		5,917 19 10	
			31,572 12 5
Deposits in hand			13,015 15 11
			£506,978 19 4
Surplus for the year ending June 24, 1873, payable to the improvement department			16,600 13 11
Balance, being excess of assets			370,307 7 2
			£893,887 0 5

[Appendix A.]

Statement of the Lamp and Private Rental (including Meter-Rents) derived from the Townships within and beyond the City respectively, for the Years 1871-72 *and* 1872-73.

	Half Year ending Dec. 25, 1871.		Half Year ending June 24, 1872.		Total for the Yr. 1871-72.	Half Year ending Dec. 25, 1872.		Half Year ending June 24, 1873.		Total for the Year 1872-73
	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.
Within the city—										
Township of Manchester—										
Private rental	56359 4 4		56900 12 10			61175 8 4		62925 15 9		
Public lamps	2773 6 5		2520 2 7			2799 8 7		3036 8 2		
		59126 10 9		59420 15 5			63974 16 11		65062 3 11	
Other townships—										
Private rental	34239 17 2		34653 4 11			37963 14 7		39538 9 3		
Public lamps	2168 5 2		2200 10 11			2215 5 5		2681 5 1		
		36408 2 4		36853 15 10			40179 0 0		42219 14 4	
Total within the city		95534 13 1		96274 11 3	191809 4 4		104153 16 11		108181 18 3	212335 15 2
Beyond the city—										
Private rental	23902 8 0		23797 15 8			26646 12 6		27035 9 7		
Public lamps	1616 0 3		1675 4 4			1721 13 0		1771 11 0		
Total beyond the city		25518 8 3		25473 0 0	50991 8 3		28368 5 6		28807 0 7	57175 6 1
Gross rental		121053 1 4		121747 11 3	242800 12 7		132522 2 5		136988 18 10	269511 1 3
Add Droylsden					3088 18 5					3249 6 7
Total					£245889 11 0					£272760 7 10

Within the city: Gross rental (1871-72) £191,809 4s. 4d.; ditto (1872-73) £212,335 15s. 2d.; increase, £20,526 10s. 10d. Beyond the city: Gross rental (1871-72) £50,991 8s. 3d.; ditto (1872-73) £57,175 6s. 1d.; increase, £6183 17s. 10d. Droylsden: Gross rental (1871-72) £3088 18s. 5d.; ditto (1872-73) £3249 6s. 7d.; increase, £160 8s. 2d. Total Gross rental: (1871-72) £245,889 11s.; ditto (1872-73) £272,760 7s. 10d.; increase, £26,870 16s. 10d.

[Appendix B.]

Comparative Statement of the Quantity of Gas transmitted from the Works, in the Day-time and during the Twenty-four Hours, for the Years 1872-73.

	Day-time.				Twenty-four Hours.			
	1871-72.	1872-73.	Increase.	Decrease.	1871-72.	1872-73.	Increase.	Decrease.
	Cubic Feet.	Cubic Feet.	Per cent.	Per cent.	Cubic Feet.	Cubic Feet.	Per cent.	Per cent.
July	16,081,000	18,018,000	12·04	....	67,167,000	72,225,000	7·53	....
August	14,161,000	18,353,000	29·60	....	76,373,000	85,347,000	11·75	....
September	18,360,000	21,995,000	19·79	....	106,064,000	113,861,000	7·35	....
October	26,124,000	34,448,000	31·86	....	162,605,000	179,740,000	10·53	....
November	35,070,000	36,625,000	4·43	....	209,637,000	219,018,000	4·29	....
December	46,583,000	45,666,000	....	1·96	239,985,000	247,348,000	3·06	....
January	41,166,000	40,256,000	....	2·21	229,262,000	234,479,000	2·27	....
February	29,223,000	37,172,000	27·20	....	178,463,000	190,228,000	6·59	....
March	24,704,000	29,641,000	19·98	....	139,840,000	155,374,000	11·10	....
April	22,351,000	21,370,000	....	4·38	103,475,000	107,901,000	4·27	....
May	19,598,000	22,139,000	12·96	....	85,115,000	90,804,000	6·68	....
June	16,917,000	16,833,000	....	0·49	68,503,000	66,822,000	....	2·45
	310,338,000	342,516,000	10·36	....	1,666,489,000	1,763,147,000	5·80	....
Add Droylsden	..	..	....	....	19,003,000	19,537,000	2·81	....
Total	..	..	....	....	1,685,492,000	1,782,684,000	5·76	....

During the day-time (1871-72) 310,338,000 cubic feet; (1872-73) 342,516,000 cubic feet; increase, 32,178,000 cubic feet. During the twenty-four hours (1871-72) 1,666,489,000 cubic feet; (1872-73) 1,763,147,000 cubic feet; increase, 97,658,000 cubic feet; add increase at Droylsden, 534,000 cubic feet; total increase, 98,192,000 cubic feet.

[Appendix C.]

Table showing the Number of each Size of Meter in use on the 24th of June, 1872 *and* 1873 *respectively, including those on Hire.*

Size of Meters.	Townships within the City.														Townships beyond the City.		Total.		Increase.	Decrease.
	Manchester.		Chorlton-u.-Medlock.		Hulme.		Ardwick.		Beswick.		Cheetham.		Total within the City.							
	1872.	1873.	1872.	1873.	1872.	1873.	1872.	1873.	1872.	1873.	1872.	1873.	1872.	1873.	1872.	1873.	1872.	1873.		
1 light	49	43	12	17	23	15	15	13	..	..	..	..	99	90	4	4	103	94	..	9
2 lights	11123	11427	3503	3623	6476	6659	2363	2465	322	383	1500	1572	25287	26129	7828	8290	33115	34419	1304	..
3 ,,	3987	3980	2153	2309	2157	2216	672	704	51	65	1105	1134	10125	10408	2903	3142	13028	13550	522	..
5 ,,	2589	2653	1414	1566	667	686	299	324	25	31	763	830	5757	6090	2206	2414	7963	8504	541	..
10 ,,	1540	1546	428	467	189	200	99	123	7	7	222	233	2485	2598	787	895	3272	3493	221	..
20 ,,	839	880	110	116	66	76	40	43	1	1	50	57	1106	1173	292	307	1398	1480	82	..
30 ,,	357	363	26	36	31	32	8	9	2	3	17	23	441	466	97	117	538	583	45	..
45 ,,	40	37	4	4	2	2	3	3	..	..	..	..	49	46	8	9	57	55	..	2
50 ,,	228	233	17	20	13	13	11	4	2	2	13	15	284	287	58	54	337	341	4	..
60 ,,	99	106	5	6	17	15	1	7	..	..	6	7	128	141	15	16	143	157	14	..
80 ,,	88	87	6	9	7	9	2	3	..	..	..	1	103	109	13	16	116	125	9	..
100 ,,	135	135	7	10	9	9	5	7	1	1	7	7	164	169	26	31	190	200	10	..
150 ,,	47	44	7	6	6	7	3	2	..	..	2	2	65	61	10	11	75	72	..	3
200 ,,	16	18	..	..	4	1	..	1	..	..	3	3	23	23	9	11	32	34	2	..
250 ,,	2	5	..	..	..	..	..	2	1	1	..	..	3	8	..	..	3	8	5	..
300 ,,	17	18	1	2	2	2	..	..	..	..	3	3	23	25	9	9	32	34	2	..
500 ,,	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	1	1	1	..	..
600 ,,	1	3	..	..	..	..	..	..	..	..	..	..	1	3	..	..	1	3	2	..
1000 ,,	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	1	1	1	..	..
Total	21157	21580	7693	8191	9669	9942	3521	3710	412	494	3691	3909	46143	47826	14262	15328	60405	63154	2763	14

Add Droylsden, 1139; total meters, 64,293. Add Droylsden, increase 65; total increase, 2828. Deduct decrease, 14; net increase, 2812 meters.

Statement showing the Number and Sizes of Meters on Hire on June 24, 1873 *(included in the above Table).*

	1 Light.	2 Lights.	3 Lights.	5 Lights.	10 Lights.	20 Lights.	30 Lights.	50 Lights.	60 Lights.	80 Lights.	100 Lights.	150 Lights.	Total, 1872.	Total, 1873.	Increase.
Within the city	88	12667	4111	1810	456	93	36	13	9	3	8	1	17413	19295	1882
Beyond the city	4	2786	1221	852	124	7	4	1	3	1	1	..	4198	5004	806
Total	92	15453	5332	2662	580	100	40	14	12	4	9	1	21611	24299	2688

[Appendix D.]

Pipes Laid and Taken up during the Year ending June 24, 1873.

Laid.	Diam. 2 in.	Diam. 3 in.	Diam. 4 in.	Diam. 5 in.	Diam. 6 in.	Diam. 7 in.	Diam. 8 in.	Diam. 9 in.	Diam. 12 in.	Total Length.
	Yds.	Yds.	Yds.	Yds.	Yds.	Yds.	Yds.	Yds.	Yds.	Yds.
Townships within the city—										
Manchester	6007	1181	262	..	45	..	205	183	..	7883
Choriton-upon-Medlock	3138	300	83	..	683	..	..	..	..	4204
Hulme	1789	2	119	..	174	..	..	..	..	2084
Cheetham	1235	79	284	..	..	..	..	..	..	1598
Ardwick	1149	209	173	..	120	..	..	..	..	1651
Beswick	888	..	..	..	..	..	..	..	..	888
	14206	1771	921	..	1022	..	205	183	..	18308
Townships beyond the city	10526	1989	2071	9	493	..	..	..	79	15167
Total	24732	3760	2992	9	1515	..	205	183	79	33475
Taken up.										
Townships within the city	289	960	366	45	25	18	..	6	88	1797
Townships beyond the city	1040	347	34	..	..	..	..	..	43	1464
Total	1329	1307	400	45	25	18	..	6	131	3261

Net increase during the year, 30,214 yards.

[APPENDIX D—*continued.*]

Summary.

	Diam. 2 in.	Diam. 3 in.	Diam. 4 in.	Diam. 5 in.	Diam. 6 in.	Diam. 7 in.	Diam. 8 in.	Diam. 9 in.	Diam. 10 in.	Diam. 11 in.	Diam. 12 in.	Diam. 13 in.	Diam. 14 in.	Diam. 15 in.	Diam. 16 in.	Diam. 18 in.	Diam. 20 in.	Diam. 22 in.	Diam. 24 in.	Diam. 30 in.	Total Length
Pipes laid to June 24, 1872—	Yds.	Yds.	Yds.	Yds.	Yds.	Yds.	Yds.	Yds.	Yds.	Yds.	Yds.	Yds.	Yds.	Yds.	Yds.	Yds.	Yds.	Yds.	Yds.	Yds.	Yds.
Within the city	218212	122413	48017	15313	28849	756	14495	13544	1438	353	28799	309	7213	4792	4043	5258	324	477	6782	2520	523907
Beyond the city	101776	50788	44295	6203	26893	410	24638	13517	721	1808	20463	..	749	45	..	4031	..	..	315	..	296654
Pipes laid during the year ending June 24, 1872—	319988	173201	92312	21516	55742	1166	39133	27061	2159	2161	49264	309	7962	4837	4043	9289	324	477	7097	2520	820561
Within the city	14206	1771	921	..	1022	..	205	183	..	..	..	..	..	..	..	..	..	..	..	..	18308
Beyond the city	10526	1989	2071	9	493	..	..	..	..	..	79	..	..	..	..	..	..	..	..	..	15167
	344720	176961	95304	21525	57257	1166	39338	27244	2159	2161	49343	309	7962	4837	4043	9289	324	477	7097	2520	854036
Deduct pipes taken up	1329	1307	400	43	25	18	..	6	..	..	131	..	..	..	..	..	..	..	..	..	3281
	343391	175654	94904	21480	57232	1148	39338	27238	2159	2161	49212	309	7962	4837	4043	9289	324	477	7097	2520	850775
Add, mains in connexion with the Droylsden works	5868	2357	4155	418	1327	..	351	..	606	..	..	..	..	..	..	..	..	..	..	..	15082
Total	349259	178011	99059	21898	58559	1148	39689	27238	2765	2161	49212	309	7962	4837	4043	9289	324	477	7097	2520	865857*

* Total, 491 miles and 169 yards.

[APPENDIX E.]

Statement showing the Amount of Gross Profit, and the Mode of its Appropriation; also the Amount of Borrowed Money Owing, and the Excess of Assets, &c., from the Year 1862 to the present Date.

Year ending June 24.	Profits.	Maximum Price of Gas, per 1000 Feet, within the City.	Appropriation of Gross Profits.			Amount advanced to Imprvmnt. Commte. in anticip'tion of future Profits.	Paid over for Improvement Purposes.	Retained tow'rds Repayment of Advances made to the Imprvmnt. Committee in anticipation of future Profits.	Balance owing of Amounts advanced in anticip'tion of future Profits.	Borrowed Money Owing.	Amount charged to Revenue in respect of Depreciation of Works and Mains.	Excess of Assets.
			Interest.	Liquidation of Mortgage Debt.	Surplus.							
	£ s. d.	s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.
1862	42667 7 1	4 0	15482 3 3	10330 14 4	7854 9 7	....	7854 9 7	....	....	382539 7 10	12179 4 11	126501 4 6
1863	55804 12 9	Half year 4 0; " 3 9	14932 17 8	18609 17 4	22261 17 9	....	22261 17 9	....	....	362877 8 10	12666 18 11	145201 1 10
1864	59545 18 9	Half year 3 9; " 3 6	13388 12 10	17810 1 0	27847 4 11	....	27847 4 11	....	....	335808 16 9	12690 12 9	163011 2 10
1865	56432 4 5	Half year 3 6; " 3 2	13086 10 9	17387 0 11	25758 12 9	....	25758 12 9	....	....	306951 2 2	13050 6 6	180598 3 9
1866	52553 2 10	3 2	13252 13 0	19781 2 0	19516 7 10	....	19516 7 10	....	....	347472 2 11	13817 2 9	200382 5 9
1867	47323 0 4	3 2	14167 11 7	19808 0 4	13257 8 5	....	13257 8 5	....	....	331725 0 7	14628 8 6	220280 6 1
1868	49546 4 7	3 2	14314 17 9	20246 0 5	14985 6 5	13059 8 5	28044 14 10	....	....	351035 10 4	15173 2 5	239685 15 6
1869	52736 18 4	3 2	15467 12 6	22638 14 4	14580 11 6	11303 19 8	25884 11 2	....	24363 8 1	395469 8 5	15387 15 7	262374 9 10
1870	65343 10 8	3 2	16784 13 8	24487 6 0	24071 11 0	3750 0 0	27821 11 0	....	28113 8 1	432941 1 9	17633 5 10	286861 15 10
1871	79322 9 5	3 2	18329 0 5	27050 15 11	33942 13 1	....	28020 11 11	5922 1 2	22191 6 11	448593 9 5	19602 10 5	313912 11 9
1872	63257 9 7	3 2	18539 19 6	27805 15 11	16911 14 2	13293 10 3	30205 4 5	....	35484 17 2	459593 9 5	22283 6 8	341718 7 8
1873	63603 0 6	One Qr. 3 2; Three " 3 4	18413 7 1	28588 19 6	16600 13 11	16641 11 6	33242 5 5	....	52126 8 8	460640 11 0	22614 18 6	370307 7 2
Total.	688135 19 3	....	186659 19 11	263887 8 0	237508 11 4	58048 9 10	289715 0 0	5922 1 2	....	....	191727 18 9	...

FATAL GAS EXPLOSION AT HALIFAX.

CORONER'S INQUEST.

The inquest on the bodies of the five girls who perished in the fire occasioned by an explosion of gas at Messrs. Lister's mills on the 4th inst. was commenced on the 12th, before Mr. BARSTOW, deputy-coroner.

The evidence taken on that day related entirely to the finding and identification of the deceased. The inquest was resumed on the 17th, when Mr. MUMFORD, solicitor, Bradford, appeared for Messrs. Lister and Sons, the owners of the mills; Mr. SHAW, barrister, with the town-clerk (Mr. A. C. Foster), watched the proceedings on behalf of the corporation; and Mr. VINCENT THOMPSON, barrister, appeared on behalf of the relatives of the deceased. Mr. WAVELL, jun., watched the proceedings on behalf of the two gas men—Crabtree and Scott. The principal witness was

Wilkinson Jackson, the foreman mechanic employed at the mills. He stated that on the night before the fire his attention was called to the valve attached to the small meter. This meter supplied 150 lights; but when trying to turn the gas on by the tap he found he could not do so. The spindle would turn, but no gas passed through the valve, and he at once sent a note on to the gas-works. The messenger returned with a man who, witness believed, was a foreman gasman. The same man generally came when anything was wrong with the meters. He showed the man the valve, and he tried it by turning the handle, and said he would attend to the meter at once, and then went away. Witness did not see anything done to the valve or tap that night. On the Thursday morning the gasmen came a little after seven o'clock; Whittaker, the man who was there on the previous night, was not with them. They said they had come to repair the valve, and he told them that the men could not go on with work in the one room it supplied until it was repaired, or daylight came on. This meter only supplied one room on the second floor. He asked them if there was a tap outside where they could turn off the gas. They replied that there was, and that they were going out to do so. He answered, "That is all right," or something to that effect. When he next saw them they were on the bottom side of the mill in the Stone Dam Road, and were digging. One of the men was down in a hole they had made outside the mill and under the footpath. The man in the hole had a long key, and he was saying as witness passed, "It's hard to turn." The other said, "Well, we'll go and take it out." Whilst witness was in the mechanics shop at the mill shortly afterwards, one of the men came to him for two bolts. This was a few minutes before the fire. He said he wanted two bolts longer than one he had brought with him. Witness gave him two. A number were thrown on the floor, and they picked them out. A few minutes after the man had gone witness heard a slight shock. He thought the engine had broken down, and he ran out of the mechanics shop and saw the fire. Flames were coming out of the lower windows of the mill. Women were screaming and men jumping from the window. The meter-room was on the ground floor of the mill. There were three meters in it, a 400-light, a 150, and a smaller one for the offices. The 400-light meter supplied the whole of the two mills and the shed, with the exception of the dressing-room, on the second floor of the old or Wade Street mill. His attention was first called to the meter by a man named Brown, who usually turned on the gas, and who on the (Wednesday) evening had found that he could not turn on the gas. The man who turned off the gas on Wednesday morning made no complaint as to the state of the valve. He (witness) believed that the gas at the large meter never was turned off except the pipes inside the mill were undergoing repair. The meter-house was never locked up. He did not know who had charge of the gas-meters, nor whose special duty it was to take charge of the meters. So far as his knowledge went he believed it was the watchman who turned the gas on and off.

By Mr. THOMPSON: After the fire he saw the two men who had been working in the hole. He asked them, "Did any one mention to you about turning the gas off?" and one or both replied, "You did." The top or lid of the valve was picked up the following night.

Models of the valve were here produced and explained by the witness.

By Mr. SHAW: He knew on the Wednesday night that there was a defect in the valve, but he did not take any steps to remedy it. As foreman mechanic his duty was to attend to the men working at the machinery. The gas would be burning until they stopped for breakfast, at about eight o'clock, when it was extinguished. His attention was called to a smell of gas in the reeling-room on the Thursday morning by Murphy, the foreman of that department, which was on the second floor. That was about half-past nine o'clock; he could not say that it might not be earlier. Witness took no steps to ascertain whether the smell was very strong, nor did he tell the two gasmen of the circumstance. There were lights required at the back part of the mill, it being dark there. He did not see them that morning, but he knew that lights were required on the dark side of the mill. He did not think that the smell of gas was so strong as to require the lights being put out, nor that, from the fact of Murphy having sent for him, there was anything serious. Murphy was in the habit of sending for him when anything was wrong with his reels, but he had never before sent with regard to a smell of gas.

In reply to the CORONER, *witness* said that when gaslights were required to be put up he generally sent for Messrs. Holdsworth's plumbers. If anything was wrong with the pipes in the mill he sent for the plumber, but if anything was wrong with the meters or the valves he reported it to Mr. Barstow, the general manager. He did not report it to Mr. Barstow on this occasion because he thought it would be put right in a minute or two. A plumber in the employment of Mr. Holdsworth was also working at the mill at the time of the fire. He was working in the shed fixing gas-pipes to some new looms. Witness saw him there before breakfast on the Thursday morning, and gave him orders to put up the gas to the looms in the shed that were not fitted up. The shed joined up to the second floor of the mill, and there was a communication by a doorway.

By a JURYMAN: Did not remember having stated in a certain room, on the night after the fire, that he had given orders to the men to turn off the gas before commencing any repairs.

George Smith, labourer, proved finding the plate of the gas-valve among the rubbish after the fire.

William Charles Coates, assistant to Mr. Tetley, having the management of the fancy weaving department, stated that on the morning of the explosion he saw a man working in the room where the meters were repairing the valve. There was a strong smell of gas in the meter-house. It did not occur to him to go into any of the rooms except the lower one, nor that if gas was burning in any of them it would be dangerous. He did not know of his own knowledge that lights were burning. After reading the letters that morning he went to some part of the working department, and afterwards came down the staircase from the stock-room or twist-room, and then noticed that the smell of gas was worse.

By Mr. SHAW: With a knowledge that probably the gas might be burning in the reeling-room and that gas was escaping, he did not go into the rooms to see if there were any lights, in order to put them out, because had he done so he should have been interfering with the manager of the spinning department, James Harling. He did not speak to Harling about it at the time.

Robert Murphy, overlooker of reeling and picking at the mills, said that from half-past eight to after nine o'clock on the Thursday morning the girls in his room complained to him of a smell of gas. He promised them to look after it, and sent a boy to the witness Jackson. Jackson came in about five or ten minutes, and said that there were two men repairing the pipes at some part of the meter. Lights were burning in the reeling-room at the time the girls complained of the smell of gas.

By the JURY: He reported the escape of gas to the foreman mechanic because he thought is was his duty to do so.

By the CORONER: Several of the windows in the room were opened.

By Mr. MUMFORD: After Jackson told him that there were some men employed at the meter, he felt satisfied all would be right. Witness took no steps to ascertain where the smell of gas came from, nor at what part it was coming into the room.

The inquiry was then adjourned till the following day, when further evidence was given as to the smell of gas in the reeling-room on the Thursday morning about nine o'clock.

Arthur Baines Whitaker, foreman meter inspector, in the employ of the Halifax Corporation, said that on Wednesday evening, a little before four o'clock, he received a memorandum, and went to inspect the meter at Messrs. Lister's mill. He put his keys down to try to turn off the gas, but could not reach the valve on the main. Originally all the mains were laid about 3 ft. deep, and had this been the case with the one in Stone Dam Road he could have reached it with his keys, but the road had been so much raised that he could not reach it though he put down his arm as well as the key.

Thomas Hanson Schofield, assistant manager at the gas-works, stated that on Wednesday evening, Dec. 3, about half-past five, he saw a complaint in the complaint-book that at Messrs. Lister's mill they could not turn the gas off or on. On the Thursday morning, at seven o'clock, he gave orders to George Crabtree and Thomas Scott to attend to the valve at Lister's mill, and to put it in working order. At ten o'clock in the morning he was at the gas-works, and hearing the explosion, and knowing that Crabtree and Scott had gone to Lister's mill, he thought something was up. He immediately took a man with him and some keys, and on arriving at Cripplegate met Crabtree and Scott, and asked what was the matter. Crabtree said Lister's mill was on fire. Witness said, "What is it through?" and he said, "From the gas."

George Crabtree, employed at the gas-works, said that on the morning of the explosion he and Thomas Scott were instructed by the last witness to go to Messrs. Lister's mill to repair a valve. They went there a little after seven o'clock, and found that the spindle of the valve was broken, and that they could neither turn off nor on the gas to the 150-light meter. They afterwards proceeded to Stone Dam Road outside the mill, and dug down to the valve, on the branch from the main to the mill, with the intention of shutting off the supply of gas whilst they repaired the valve. In this, however, they failed, being unable to turn the spindle. They might have succeeded had they gone to the gas-works for other assistance and stronger keys, but as the job was only a small one they thought they could do it whilst they were going to the gas-works. They, therefore, made a hard ball of greasy waste, and prepared a quantity of putty. Then they took off the face-plate of the valve, and stopped up the 3-inch pipe with the ball and the putty, making it gas-tight. They then took the spindle to the gas-works, repaired it, and arrived back at the mill in about 15 minutes. There was no smell of gas in the meter-house at the time, nor did they know there were any lights in the mill. They took out the ball and putty, and replaced the plate, being occupied in this two or three minutes. Crabtree was putting the first bolt into the plate at one corner when the explosion took place in the room above, and immediately the flames rushed downwards to where he was, igniting some skeps of paper, and he had to make his escape through the flames, leaving the valve unsecured. Had he known that there were lights in the rooms above he would not have attempted to do the work without shutting off the supply of gas from the outside of the mill. He had frequently put in valves in the same way in the streets, but only once before inside a building. He never had a lamp in the meter-house, nor was there any light in the room where the meters were.

Thomas Scott, who was with Crabtree when they were doing the work, was next examined, and generally corroborated the evidence of last witness.

The inquest was then adjourned till the 23rd inst.

The inquest was resumed on the 23rd inst.

Several persons in the employ of Messrs. Lister were examined, who proved that there was a considerable smell of gas in various parts of the premises on the morning of the explosion. This smell was supposed by them to arise from slight escapes at the joints of the fittings, but all concurred in expressing belief that when the explosion took place the noise and flames appeared to come from below, and in the locality of the meter-house. There were several lights in the weft-room, which was on the storey immediately above the meter-room, and the witnesses did not seem to be at all aware that the gasmen were at work below that morning.

Mr. *George Dunbar Malam* was then examined. He said: I am manager of the Halifax Corporation Gas-Works. Understanding that I should be called in reference to a statement of the witness Crabtree, that he made the repairs in the valve in two minutes, I resolved to test whether it would take that time to make the repairs or not. On Saturday morning last I gave instructions to Crabtree and Scott to fix together a 3-inch pipe and a 3-inch valve similar to those that were in Lister's mill at the 150-light meter. I ordered them to take the bonnet off the valve, and take the disc and spindle out of the valve. I then ordered them to plug up the 3-inch pipe with a ball of the greasy waste such as they used when they were repairing the valve at Messrs. Lister's mill, and on the top of that greasy waste to place the putty.

Mr. MUMFORD asked the coroner whether he thought this evidence was admissible. Mr. Malam did not speak to the cause of the accident at all. He was produced as a scientific witness, and if his evidence was admitted he (Mr. Mumford) could call other scientific witnesses, and the inquiry would be prolonged indefinitely. The valve that these experiments were made with might not be an exactly similar valve to the one in question.

The CORONER thought the evidence had some bearing upon the case, as showing how long it would take to perform a certain operation.

Mr. SHAW: And whether any gas could escape in the time.

Mr. MUMFORD said that this valve might be a different valve altogether from the one in question, which might have allowed the gas to escape for some time. The two things could not be similar.

The CORONER said he should prefer to leave the question of the admissibility with the jury. If this scientific evidence was to be received, Mr. Mumford must have an opportunity, if he chose, of calling other scientific evidence.

The jury expressed an opinion that the evidence would be valuable to them, and they would like to hear it.

Witness continued, and said Crabtree and Scott carried out these orders. It took ten seconds to take off the putty, to extract the greasy ball of waste, insert the disc of the valve and the spindle, and thrust up the bonnet against the "puttied" flange of the valve. Then the escape of gas would be practically at an end. This experiment was performed in the presence of myself and Alderman Berry, the chairman of the Gas Committee. On Sunday I had the valve and pipe fixed in the meter-testing room, close to the test gasholder, and I had a connexion-pipe attached to the 3-inch pipe and the test gasholder. We then put on a pressure underneath the ball of waste to try to blow it out or cause an escape from underneath the joints of the putty. We did the same again last evening, in the presence of various gentlemen, and we put 5½ inches pressure of gas, in order to see whether we could get an escape underneath the joints of the putty. We put a light round the joints, but there was no escape. The experiment was also tried of taking out the greasy ball, and putting the spindle and the valve on to the place, and it took about the same time.

By the JURY: Out of a 3-inch pipe fully open about 188 cubic feet per minute would escape at ½-inch pressure. The men were wrong when they said it took two minutes at the valve. A man would be stifled if he stood over the meter with 400 feet of gas escaping in two minutes.

By Mr. MUMFORD: Had been manager at the gas-works nine years. There were no printed directions given to the men. There were verbal instructions given that all valves and taps should be turned off and all lights put out when any internal repairs were being done. The document now produced was the gas-pressure register for the day of the explosion. The pressure at seven o'clock in the morning was 1 inch and 3-10ths, at half-past seven the same, at half-past eight ½-inch, and at nine about ½-inch. Had not seen the valve taken out at Messrs. Lister's. The valve they had worked with was, however, exactly similar; at least, so he was informed by his assistant-manager.

By Mr. WAVELL: Crabtree was as steady and careful a workman as could be got hold of anywhere.

William Henry Hudson, engaged in the fancy weaving department of the mills, said before the explosion he and a mechanic named Westerman, finding there was a smell of gas, went into the lobby of the third storey, and tried, but found no taps left open either there or in the warp-room adjoining. After a little more searching about, witness told Westerman that he thought the smell came from the staircase, and as a plumber was about the place Westerman said he would go for him. Subsequently he saw the plumber examining the pipe, and he (witness) went into the counting-house, where he was when the explosion took place.

By Mr. MUMFORD: Was present in the lobby when the door opening from the staircase was opened by some one, and he then thought the smell came from the stairs.

James Siddall, the plumber referred to, proved repairing the swivel of a bracket in the lobby, on the morning of the explosion, from which there was a slight escape of gas. He smelt no escape of gas until he examined that swivel. The escape was very small. The 400-light meter supplied, he believed, every room in the mill except the warp dressing-room, which was supplied from the 150-light meter. There was a stop-tap for each room except the warp dressing-room. When the explosion took place, witness at that time being at the swivel, it lifted up the boards on which he was standing, sending him with his chin against the cross-piece of the door. He believed the explosion was from below.

Other workpeople in the premises were called to prove the smell of gas on the morning of the accident. One, a boy named Bradbury, said he was at the mill at six o'clock, in the warehouse, and saw Crabtree and Scott come out of the meter-house and put a lamp on the scale. The lamp was burning, and the witness put it out. He smelt the gas between seven and eight o'clock in the warehouse.

After some further evidence had been taken, the CORONER summed up at considerable length, pointing out to the jury the necessity for them to go in strict accordance with the evidence, and if, in their opinion, any person or persons had by culpability, and gross neglect of duty, caused the deaths of the deceased, they must return a verdict accordingly.

The jury then retired to consider the verdict, and after having been absent for one hour and a quarter, returned with the following verdict:—"The jury are unanimously of opinion that the verdict should be accidental death from fire caused by an explosion of gas at Wellington Mills, Halifax, on Dec. 4, 1873, the cause of which there is no satisfactory evidence to show. The jury are of opinion that there was great neglect on the part of Messrs. Lister's men in having gaslights burning, and it was a mistake of the gasmen in not having first turned off the valve at the service-pipe."

GREENOCK (CORPORATION) NEW GAS-WORKS.

These works, which were recently opened, are erected on the island of Inchgreen, which lies on the margin of the river between Greenock and Port Glasgow, and are intended to supersede the old works in West Blackhall Street, which were built so long ago as 1827.

The Inchgreen Gas-Works were commenced in Dec., 1871, and have been carried out under the guidance and on the plans of Mr. S. Stewart, engineer. They are built upon an area of 5½ acres of ground. The contractors were Messrs. W. and J. York, for one class of work, and Messrs. Hanna, Donald, and Wilson, for another. The total contracts, in round numbers, were £50,000, and the cost, when completed, including price of large main and amount paid for land, about £70,000. The works are intended to supply the whole town, and will be capable of producing 2 million cubic feet in 24 hours, or about three times the capacity of the old works or the present demand. At present, although apparatus equal to the full supply mentioned is completed, retort benches equal to only 1 million cubic feet in the 24 hours are built, but these are arranged so as readily to admit of future extension. The retort-house is 274 feet in length and 120 feet in width, including coal stores, which are ranged along either side of the house, from which they are separated by cast-iron columns. The whole forms an open airy space covered by three roofs, which are very high, preventing all chance of annoyance to the workmen from smoke or steam when the retorts are charged or drawn. The great width of the retort-house, also, prevents the workmen being subjected to that excessive heat which those employed in such places are usually exposed to. There are two condensers or coolers, each consisting of a row of annular tubes 3 feet 6 inches in diameter, by 25 feet in height, with 16 tubes in each row. There are also three scrubbers or ammonia purifiers, each 9 feet in diameter by 25 feet in height. Both condensers and scrubbers stand over the tar-tank, into which the condensed tar and water immediately fall. Adjoining this is the pump-room, containing the tar and water pumps for supplying the scrubbers and drawing water from the river. The exhauster-room is near to this. It contains two exhausters on the compound steam and gas cylinder principle. Close by is the boiler-house and workmen's room, to be fitted up as a mess-room, and provided with baths, &c., for the convenience of the *employés*. The works contain eight purifiers, ranged in two sets of four each, having at hand the lime and oxide sheds. The purifiers are each 20 feet square by 4 feet 6 inches deep. From the purifiers the gas proceeds to the house containing the station-meter (indicating the gas made) and governor for regulating the flow to the town. This house is made large enough to admit of the putting in of an additional meter when required. There are three tanks for holding gas. Two are 124 feet in diameter, and one 102 feet. Only one of the larger tanks is at present fitted with a gasholder, which has a capacity of 600,000 cubic feet. The second is intended to have the holder at present in the Glebe, and the other is to be provided with a holder when necessity requires it.

The offices and workshops are placed near the entrance. The works are approached by a bridge thrown over the timber ponds, and are so arranged as to give every facility for the economical manufacture of gas. The spare ground is sufficient to permit of the works being enlarged to double their present capacity, even when in full operation. A spacious jetty on the river side, near the end of the retort-house, allows of the discharge of coals direct from the lighters into the stores.

GAS WELLS IN AMERICA.

By Prof. J. S. NEWBERRY.

This popular record of the facts connected with gas wells was prepared for the *Cleveland Herald* by Prof. Newberry.

The many inquiries addressed to me in regard to the possibility of obtaining gas at Cleveland, by boring for it, indicates some interest in the subject, and prompts me to send you the following *résumé* of "what I know about our gas wells." Carburetted hydrogen is the chief component of the gas which escapes from the earth in wells and springs in many localities. It is evolved in the working of coal mines, and constitutes the "fire-damp." It is also a constant associate of petroleum, and always issues in greater or less quantity from oil wells. It is given off, too, in the decomposition of recent vegetable matter, and may be seen bubbling up through the water of all pools in which plants are decaying. When it escapes from the earth it may be generally traced to beds of bituminous matter—such as coal, lignite, carbonaceous shale, asphalte, oil, &c. From these substances it may be obtained by artificial distillation, and is evolved by the spontaneous decomposition which all organic substances suffer on exposure.

As carburetted hydrogen produces a brilliant light in combustion, it is largely manufactured for the illumination of cities and residences. So extensively is it employed for this purpose that it may be regarded as an indispensable element to our modern civilization. It is not strange, then, that efforts have been made to utilize the immense quantities of gas which flow from wells and springs in so many different countries. The Chinese have for hundreds of years used for lighting and heating the gas which emanates from the earth in several provinces of their country. In the United States the gas which issues from the salt wells of the Kanawha Valley has been for many years employed as a fuel in the evaporation of the brine.

The town of Fredonia, in Western New York, has for more than forty years been fully or partially lighted by gas which issues from springs at that place. In the borings made for oil in the various oil districts of the Western States, the gas which has been produced so abundantly has been regarded as a useless, frequently an inconvenient and dangerous, product. Within a year or two past, however, this gas has been utilized in numerous localities, and already a large number of wells have been bored for the express purpose of obtaining it. In some cases these gas wells have been highly productive, furnishing an abundance of material for heating and lighting in its most convenient and manageable form, so that this deserves to be reckoned as one of the important elements in the mineral resources of our country. As this method of procuring carburetted hydrogen gas forms a new industry, and one which will probably assume considerable importance, a few words in reference to its present condition and prospects may not be without interest to the public. I therefore extract from my notes a few facts in regard to some of the most interesting of our gas-producing districts. On the Upper Cumberland, in Kentucky, gas accumulates in such quantities beneath the sheets of lower Silurian limestone, that many hundred tons of rock and earth are sometimes blown out with great violence. These explosions have received the local name of "gas volcanoes." In Ohio gas escapes from nearly all the wells bored for oil in the oil-producing districts. Of these, two bored by Peter Neff, Esq., near Kenyon College, in Knox County, present some remarkable features. These wells were bored in 1866, at the same geological horizon as that which furnishes the oil on Oil Creek, Pa. At the depth of about 600 feet, in each well, a fissure was struck from which gas issued in such volume as to throw out the boring tools and form a jet of water more than 100 feet in height. One of these wells had been tubed so as to exclude the water, and gas has continued for five years to escape from it in such quantity as to produce, as it rushes through a 2½-inch pipe, a sound that may be heard at a considerable distance. When ignited the gas forms a jet of flame 3 feet in diameter and 15 feet long. The other well, which has never been tubed, constantly ejects, at intervals of one minute, the water that fills it. It thus forms an intermittent fountain, 120 feet in height. The derrick set over this well has a height of 60 feet. In winter it becomes incased in ice, and forms a huge translucent chimney, through which at regular intervals of one minute a mingled current of gas and water rushes to twice its height. By cutting through this chimney at its base, and igniting the gas in a paroxyism, it affords a magnificent spectacle—a fountain of water and fire which brilliantly illuminates the ice chimney. No accurate measure has been made of the gas escaping from these wells, but it is estimated to be sufficient to light a large city.

At West Bloomfield, New York, is another gas well, not unlike those I have described. This is bored to the depth of 500 feet, reaching down to the vicinity of the Marcellus bituminous shales. From some measurements made by Prof. Wurtz, it appears that about 15 cubic feet of gas escapes from this well every second. It is proposed to utilize this large amount of valuable combustible by conducting it through pipes to Rochester, a distance of 20 miles.

At Erie, Pennsylvania, there are now twenty-five wells in successful operation, most of which have been bored for the special purpose of obtaining gas. Mr. Henry Newton, my assistant in the School of Mines, has recently made, at my request, a careful examination of all these wells, and has given me a detailed description of each. I quote one or two of these for the purpose of conveying a clear idea of their general character.

1. H. Jarecki and Co. (Petroleum Brass-Works) have two wells; the first bored for oil in 1864, 1200 feet deep. No oil was obtained, but brackish water and an abundant supply of gas. This is used to light a few houses. The second well was bored in March, 1871, for gas, is 700 feet deep, and is used to supply gas to light the shop and heat the boilers. The supply is not at all regular, and has perceptibly failed since the Conrad well was sunk near it. The heating power of the gas from well No. 2 is roughly estimated at from 8 to 10 tons of coal per month.

2. Brevellier's well was sunk for oil in 1864; depth, 625 feet; diameter, 5 inches. The gas supplies five fires in the soap factory and three in the house of the proprietor, besides lighting both establishments. It has been used in the factory for five years. . . .

At Conneaut and Painesville, Ohio, wells have been bored for gas with entire success, and others are being bored in these localities, and at many points further west.

In the vicinity of Cleveland, as in many other localities in the eastern half of the State, gas and oil springs are frequently met with, and wells have been bored for one or the other of these useful articles. Here, as elsewhere, there are two marked lines of gas and oil springs, connected with the outcrops of the two sheets of bituminous shale which underlie the surface—first, the Cleveland shale of lower carboniferous age, which crops out along the base of the hills that bound the Cuyahoga Valley. This bituminous shale is from 30 to 60 feet in thickness, and is the source of the oil of the East Cleveland and Kingsbury Quarries, the noted gas spring at the brick-yard beyond East Cleveland, &c. The oil of Mecca and Liverpool is derived from the Cleveland shale. Secondly, the Huron or Great Black shale, which passes beneath Cleveland, and rising westward comes to the surface in Huron and Erie Counties, and forms a broad belt of outcrop, thence to the Ohio River. The Huron shale has a thickness of 300 to 400 feet, mostly black and highly bituminous, and is the source from which the gas of the Neff wells and the wells of the lake shore and the oil of Oil Creek are derived. In the valley of the Cuyahoga, in both Cuyahoga and Summit Counties, a large number of wells were bored for oil some years since. Most of these yielded both gas and oil, but neither in large quantity. From a similar well in the valley of Rocky River, a copious flow of gas has continued to escape for several years. . . .

From these facts it will be seen that the flow of gas from wells bored in Cuyahoga County has been, on the whole, considerably less than from those farther east, and scarcely sufficient to warrant any great confidence in the success of experiments of this kind.

Since the geological formation at Cleveland is precisely the same as at Painesville, Conneaut, and Erie, the difference noticeable in the quantity of gas obtained by boring in these localities has excited some surprise. The solution of the problem is, I think, this: As we approach the Alleghanies we find the strata which underlie Eastern Ohio and Western Pennsylvania more disturbed and broken. . . .

The illuminating power of the gas of the West Bloomfield well and that from the wells of Fredonia and Erie has been measured, and found to be about one-half that of the gas used in most of our cities; or, technically, it is 7 or 8 candle gas, our city gas ranging from 14 to 18 candle power. It has usually the odour of petroleum, and contains a small quantity of condensable petroleum vapour. It is heavier than common street gas, and its heating power is greater. It contains carbonic acid and carbonic oxide, and when these are removed by passing it through a purifier its illuminating power is increased and its heating power diminished. All who use it speak of it in terms of high praise, as being extremely convenient for heating and lighting, and without objectionable qualities. When delivered from the well directly to the burners and not consumed, it accumulates so that the pressure sometimes bursts the pipes. A steam-gauge applied to one of Mr. Neff's wells, in Knox County, ran rapidly up to 180 lbs., the highest pressure it would indicate. The pressure of the gas in the bottom of the well not tubed is certainly much greater than this, as it lifts a column of water not less than 500 feet in height. The gas of the well has no offensive odour, which is regarded as an excellence, but which may be a source of danger in its use. The offensive odour of street gas betrays its presence at once, reveals leaks, and prevents accumulations and explosions, so that it may be regarded as almost indispensable to its safe use. The value of a well producing a copious flow of gas can hardly be over estimated. If the wells of Mr. Neff had been so located that their enormous product could have been utilized, they would have yielded larger pecuniary returns to their owner than any oil well has ever done.

The comfort and elegance imparted to an establishment by an abundant flow of odourless gas are well shown in the residence of General Casement. Here every fire in the house, in the kitchen range, as well as the parlour grate, is fed by a fuel which gives a brilliant, cheerful flame, is supplied and cut off by turning a stop-cock, makes little smoke, and leaves no ashes; and all this in addition to an abundant supply for illumination. So great a luxury as this is makes doubly fortunate the man who possesses it, and is certainly worth some trouble and expense to those who would enjoy it.

ADVANCES IN THE PRICE OF GAS.—At the monthly meeting of the Huddersfield Town Council, on the 15th instant, it was resolved—"That on the recommendation of the Gas-Works Committee the price of gas be increased, on and after the 1st of January next, from 3s. 9d. to 4s. per 1000 cubic feet, the scale of discounts being continued as at present; and that the price of gas supplied to the public lamps be increased from 35s. to 40s. per lamp per annum." It was stated in the last JOURNAL that the price of gas in Wrexham had been raised from 4s. 8d. to 5s. 2d. It should have been 4s. to 4s. 8d.; 4s. 6d. to 5s. 2d.; and 5s. to 5s. 8d., according to distance. The Phœnix Gas Company have given notice that the price of gas will be increased to 4s. 6d. per 1000 cubic feet from the expiration of the current quarter. The Board of Trade have sanctioned an advance at Cork from 4s. 9d. and 5s. 3d. to 5s. 3d. and 5s. 9d. In the case of the public lights, the price for 4-feet burners is to be advanced from £4 to £4 8s. 6d.

LIMERICK (CORPORATION) GAS-WORKS.—The appointment by the Gas Committee of Mr. Hennessy as manager and engineer of these works was the subject of a very animated debate at the meeting of the Town Council on Thursday, the 18th inst. Before the discussion, a deputation from different wards of the city to oppose the appointment was received, the ground of objection being that Mr. Hennessy was not a practical and experienced gas engineer, and that he did not give his entire time to the important duties of the office. In the course of the debate these points were made much of, and it was alleged, moreover, that the appointment was connected with the recent contest for the mayoralty. On the other hand, it was argued that as Mr. Hennessy was a fellow-citizen, and a civil engineer, and held a certificate of competency, the action of the Gas Committee was justifiable and judicious. On a division, however, the council, by 14 votes to 13, refused to sanction the appointment.

GAS EXPLOSION IN MANCHESTER.—An explosion of gas occurred in Portland Street on Saturday afternoon, Dec. 20, whereby three persons were injured. Five workmen in the employ of the Corporation Gas Committee were connecting a pipe, in the basement of Messrs. Waters's warehouse, with a main at the edge of the footpath, and one of them had tapped the main, when a sheet of flame suddenly shot into the air, and before the workmen could get out of the way three of them were burnt about the face and hands. In two of the cases the injuries were very slight, but Edward Thomas, gas superintendent, living in Brook Street, was severely burnt about the face, and had to be conveyed to the Royal Infirmary, where his injuries were dressed. He was then able to proceed home, but continues to be an out-patient of the institution mentioned. The engines were speedily in attendance, but their services were not required, the flame having been put out by a patent extincteur belonging to Messrs. S. and J. Watts. The cause of the explosion was a lighted candle which one of the men was using in the cellar of the building into which the gas escaping from the tapped main found ingress.

GAS COMPANIES PENNY READINGS.—The *Sydenham Times* speaks of a most praiseworthy and successful effort just made at St. Michael's School Room, Lower Sydenham, for the amusement and edification of the workmen employed by the Crystal Palace District Gas Company, by an entertainment undertaken by the officers of that company; the programme comprising, in addition to readings, pianoforte duets, solos, and songs, an excellently rendered comic sketch, entitled, "Scene in a Lodging-House." The chair was taken by Mr. James Watson, the engineer to the company; and the names, and not the names only, but also the performances of the chairman and of the secretary, and of two or three members of the families of those gentlemen, figured conspicuously in the evening's entertainments. One interesting fact in connexion with this entertainment was, that the pence received for admission have been handed to the treasurer of the sick fund for the workmen of the company.

IPSWICH SCIENCE GOSSIP SOCIETY.—At the annual *conversazione* of this society on the 10th inst., Mr. D. Ford Goddard, assistant engineer to the Ipswich Gas Company, exhibited a working model of a gas-work. Having first charged the retort with coal, he submitted it to a great heat, thus obtaining all the volatile products. Of these some were heavier than others, and were removed by passing them through a series of pipes to reduce the temperature, by which they were condensed and came into a tank in the form of tar. The ammonia had next to be removed. This was done in a washer or scrubber, where the gas passed over several trays of water, which very readily absorbs all ammonia. Next the carbonic acid gas, so dangerous to life, had to be taken away. To do this the gas was passed through a purifier containing lime, which united with the carbonic acid and thus withdrew it from the gas. The last, and perhaps worst impurity was the sulphur, to get rid of which the gas had to go through another purifier, filled with oxide of iron. Having purified the gas, it passed through a meter to register the quantity made, and into a small gasholder. Thence it was brought to a burner, which revolved as the gas issued from it. In conclusion, a few chords were struck on Mr. Goddard's original and ingenious

invention, the gas organ. The lecture occupied 20 minutes, and was delivered four successive times, to full audiences. Every part was illustrated with some appropriate experiment.—*Local Paper.*

THE GAS PURIFICATION AND CHEMICAL COMPANY.—On the 19th inst., the Gas Purification and Chemical Company exhibited to an assembly of gas managers and chemical manufacturers their mode of extracting the valuable materials collected together in what we know as spent oxide. The process consists in first washing out the sulphate of ammonia, the amount of which in spent oxide was larger than we expected. The quantity, however, will obviously vary according to the efficiency or not of the scrubbing apparatus. The next step is the extraction of the sulphur by means of bisulphide of carbon. This is done in a very ingenious apparatus which we are precluded from describing, inasmuch as it is the subject of a patent not yet completely specified. It is sufficient to say that 54·5 per cent. of sulphur was extracted in a merchantable form from a sample of spent oxide containing 57 per cent. The apparatus, we ought to say, is so effectually sealed that no odour of the bisulphide was perceptible, and there is consequently no loss of that volatile material. The last step is the treatment of the residual oxide for the purpose of obtaining Prussian blue or yellow prussiate, which is accomplished without difficulty and by the use of simple apparatus. After all this treatment, the oxide is left in a condition to be returned to the purifier as new oxide. Should the sulphur-extracting apparatus act as well on a large as on a small scale, which we see no reason to doubt, it is clear that a very profitable business may be done by the Chemical Company, while some advantages must accrue to the gas companies. The value of spent oxide will certainly go up, and the Chemical Company are wise in calculating on having to pay double the present price. They may perhaps find it advantageous to pay gas companies to use their oxide.

THE BOLTON CORPORATION AND THE GAS-WORKS.—At a recent meeting of the corporation, Mr. Councillor Holden, as chairman of the Gas Committee, made a statement relative to the financial prospects of that department of the corporate affairs which is likely to have a somewhat damaging effect upon the public. It is but about six months since we were congratulating ourselves upon the handsome balance of £15,000 which had accrued from the gas-works during the preceding year, and we now learn that a large proportion of that sum will be swallowed up in the increased price of coal and cannel. The most that Mr. Holden would permit himself to say by way of softening the blow was to express a hope that when all the current expenses had been provided for there would remain a balance in hand sufficient to meet the depreciation-fund. He did not think, however, it would be judicious to increase the price of gas to the consumers, but in this he was opposed by Alderman Cannon, who remarked that it would scarcely give satisfaction to the ratepayers to find a gigantic concern like the gas-works carried on by the corporation without profit, and he advocated a slight increase in the tariff. Other members urged, however, that before making any change, they should have fuller information before them, and this advice was eventually concurred in by the council.—*Bolton Chronicle.*

DEATH OF MR. WILLIAM BLACKBURN.—A correspondent sends us intelligence of the sudden death of this gentleman on the 19th inst. He was attending a meeting of the Hebden Bridge Cotton Spinning Company, of which he was a director at the time, he was seized with illness, and in a few minutes he breathed his last. Many years ago Mr. Blackburn undertook the management of the Hebden Bridge Gas-Works, when they were in a very low condition. Under his care the business increased threefold, and the dividends of the shareholders were raised to 10 per cent. Few men were more esteemed than Mr. Blackburn in the town where he resided, and the members of the Gas Managers Association, who met with him at their annual gathering, will long recollect his beaming cheerful countenance, and his intelligent sprightly conversation. The directors of the Hebden Bridge Company deeply mourn his loss, and they testified their respect for him by carrying his remains to their last resting-place.

SKELTON'S CATOPTRIC STREET-LAMPS.—We have on previous occasions referred to these lamps, and expressed our opinion of their superiority over the lamps in ordinary use. We are glad to find this useful invention steadily making progress, and have now to record the introduction of this system in lighting Cheapside. The effect produced in a street thus entirely lighted by these lamps is certainly pleasing, and the street, as a whole, looks bright and cheerful, as compared with the adjacent streets where only common lanterns are in use. Nor is it only in appearance that the gain is evident, as we notice an absence of the dark shadows of the lamp-frame upon the roadway, and find an even diffusion of light everywhere throughout the street, and this gain is obtained without throwing the upper parts of the house fronts into darkness, a defect common to all other kinds of street-lamp reflectors. Nor is any glare apparent; indeed, so well is the reflected light diffused, that when used to these lamps we hardly notice their increased light, but on turning into a street lighted in the usual way, the feeble effect and dull appearance of the unreflected flame in a common lantern is painfully apparent, and we at once recognize the effect of the enormous waste of light in our common street-lamps, and rejoice that at last a practical means has been invented and put into actual use to prevent that waste, or rather to give the public the full benefit of the gas consumed. Were the catoptric lamps in general use, as they must eventually be, we should hear little more about the defective lighting of the streets. We must refer to Mr. Skelton's patented method of opening the lamp bottoms for torch lighting. These Cheapside lamps are fitted with them, and the plan seems simple and perfect, well worthy of extensive introduction.

RICHMOND (SURREY) WATER SUPPLY.—The vestry of Richmond, at a specia meeting held on the 18th inst., resolved that plans and sections of artesian wells and works for supplying the parish with a complete and constant supply of water be prepared for submission to the Local Government Board.

DUNDEE WATER SUPPLY.—The contract for the pipes required in connexion with the new water supply from the Loch of Lintrathen to Drouly, a distance of nearly 13 miles, has just been entered into. Seven offers were considered by the commissioners, ranging between £80,000 and £90,000; and most of them were submitted from Glasgow ironfounders. The estimates were given separately for the supply of the pipes and the laying and jointing, the highest offer for the piping proper being about £88,000, and the lowest about £75,000; while the offers for the laying and jointing ranged between £5000 and £7000. The offer accepted was the joint offer of Messrs. Edington and Sons and Messrs. D. Y. Stewart and Co., both of Glasgow. It included the sum of £77,557 15s. for the pipes, and the further sum of £6609 12s. 2d. for laying and jointing them. It is believed that the total contract price is a fair one, and yet it is somewhere about £10,000 lower than the estimate fixed by the engineer, Mr. Leslie, C.E.

BISHOP AUCKLAND WATER SUPPLY.—A member of the new Local Board of Health at Bishop Auckland (Mr. J. Duff) has made a proposition to supply the town with water gratuitously. At a recent meeting of the board, a letter from Mr. Duff was read, in which that gentleman said:—"1. I propose to supply water *free of charge* for twenty-five years to all ratepayers within the Board of Health district who require it for domestic purposes only, and also the water required for watering the streets. 2. All persons using the water for commercial or manufacturing purposes to pay on the same scale of charges on the rateable value of their premises as at present, or by meter, in cases where I consider it necessary, at the rate of 9d. per 100 gallons. 3. I will keep in repair all existing works and mains, but if the board should at any time, from the extension of the town or other causes, require additional storeage reservoirs or new mains, such new works to be paid for by the board. 4. The board to delegate to me, for and during a term of years to be agreed upon, the existing plant, and full powers for obtaining and filtering the water, and for making the necessary erections, excavations, and other works, for the erection of a turbine wheel, and supplying the water power, and for excavating in the streets or other public places when necessary for repairs or making connexions. 4. The inspector of nuisances appointed by the board to continue as part of his duties to inspect all water-taps, and report any waste of water to me. I am prepared to give ample security for the carrying out of the contract." A legal difficulty stands in the way of the acceptance of this generous offer. The clerk to the board has advised that body that it is not competent to them to enter into the agreement required by clause 4 of the above proposition.

LAMENTABLE BOAT ACCIDENT.—On Saturday, Dec. 20th, a sad disaster occurred at West Moulsey, causing the death by drowning of at least eight men. It appears that Messrs. Aird and Son, contractors, of Belvedere Road, are constructing new reservoirs for the Lambeth Water Company on the banks of the Thames at West Moulsey, where 200 or 300 men are employed. About a quarter-past four on Saturday afternoon, 18 of these men had entered a boat to cross the river to their homes. The boat, which was much overcrowded, had got only a few yards from the shore, when it dipped under water. It immediately sank, and all its occupants were thrown into the water, which is very deep at the spot. Of those on board ten were saved, two by clinging to the boat, which had turned bottom upwards, and the others by planks thrown to them from the shore. The men had been warned of the danger of overcrowding, but without avail.

HUDDERSFIELD (CORPORATION) WATER-WORKS.—An official inquiry has just been conducted at Huddersfield, before Mr. C. Gott, C.E., as the hydraulic engineer appointed by the chairman of quarter sessions for the purpose of carrying into operation and effect the provisions and powers of the 30th section of the Huddersfield Water Act of 1869. By that section it is enacted that, as compensation for the waters which the Act authorizes the corporation to take, the corporation shall cause to flow from the reservoir at Deerhill to and into the Rams Clough Brook at Marsden a total quantity of 669 gallons of water per minute. The town-clerk at the commencement of the proceedings stated that it was a matter of indifference to the corporation in which way the water was divided, so long as the supply did not exceed 669 gallons; and being, therefore, perfectly disinterested in the matter, he would leave it in the hands of any other person who had anything to say. The corporation were willing to give every assistance in their power, both as regarded acreage and any gaugements there might be. It occurred to him that the *primâ facie* basis, unless it could be displaced by any peculiar, claim of one district over another, was the principle of acreage. It was then for the proprietor, or any other person interested in a particular stream who claimed more water than was proportionate to his acreage, to lay special circumstances before the engineer, so that he might have materials before him in forming his judgment. In preparing their Water Bill in 1868, Mr. Crowther examined the acreage, and drew up a statement thereof, to which the corporation had intended to confine their compensation; but it occurred to Mr. Hawksley that there might be special circumstances which might render that principle of acreage liable to be departed from, and that possibly some persons interested in certain streams might be dissatisfied in having it thus defined what their particular proportion should be. Therefore the corporation did not insert a clause in the bill that they should be bound by the acreage in giving compensation, but that, while it should form the principle basis, allowance should be made for the greater claim which one proprietor could establish over another. He produced a statement showing the number of acres of ground drained into each of the several streams, eight in number, After some conversation, all parties agreed with the statement and plan put in and the gaugings to be supplied. It was also agreed that Mr. Gott, with the acreage and gaugings before him, should be left to make his own determination upon the subject matter.

STRIKE OF STOKERS AT THE COPENHAGEN GAS-WORKS.—The correspondent of the *Standard* states that the stokers at these works have suddenly struck for an advance of wages. "Instead of the present payment of about 3s. a day, they insist upon an increase of nearly 1s. all round. Unfortunately, the director of the gas-works had made no provision for such an emergency, and the town of Copenhagen was last night (Dec. 21) nearly entirely in darkness, only sufficient gas being found to light about one-third of the street-lamps, while the private houses, shops, and even theatres, were, so to say, entirely without gas, and had to improvise all sorts of lamps, reflectors, torches, &c. The front of the Royal Theatre was lighted up with burning tar and pitch torches, while the shops, crammed with Christmas presents and "The Compliments of the Season," only succeeded in making darkness still more visible, and made a pitiable show with their train lamps, composites, stuck up everywhere, and in all kinds of candlesticks, from the orthodox one down to the pint bottle. The extraordinary fact is that the one-half of the inhabitants of Copenhagen seemed to have given the other half rendezvous in the streets, and till late on in the night the streets were actually crammed with people; everybody and his wife came forth to see the novel sight, to laugh at the ingenuity displayed by the shopkeepers on the one side, and to use some pretty strong expressions against both the gas stokers and the director on the other. The only person I met who thoroughly seemed to enjoy the whole affair was an old gentlemen of 83, who rubbed his hands, and walked about in high glee in the half-dark reading-room in the club; he seemed to be quite young again, and to fancy himself suddenly carried back to 'auld lang syne.' To-night it appears that we are to have no gas at all, and the indignation is everywhere running very high, except in the house of M. Holmblad, our largest manufacturer of composites, who finds his stock getting pleasantly low. This strike coming, and of course purposely, at the busiest time of the year, does a great deal of harm, and a great many actions for damages against the gas company are sure to follow, while I am told that it is the intention to prosecute the stokers to the utmost rigour of the law; and if we are to judge from the decisions in the cases of the Socialists, these men may yet have reason to regret their foolish and mischievous conduct."

ODESSA WATER-WORKS.—It appears almost incredible that the thriving town of Odessa, with its population of more than 200,000 souls, should hitherto have been so destitute of water that during the summer months there has not been sufficient to afford a supply even on the most limited scale. Nevertheless such is the fact, and so recently as last summer water had to be imported from Sebastopol and Nicolaieff at a cost of no less than 2s. 8d. per cask of 108 gallons delivered in the harbour. A little more than two years since, however, the local authorities became seriously alarmed at this condition of matters, especially in view of the enormous increase which is constantly accruing to the population. They, therefore, granted to Mr. C. W. Schwaben a concession for bringing water into the town from the river Dniester, a distance of upwards of 26 miles from the city, that being the nearest available source of supply. With the object of constructing the works, an English company was formed in March last year, the directorate being composed of gentlemen connected with some of the leading London water companies. So much energy has been infused into the undertaking, and such expedition has been shown in the construction of the works, that they have been completed and put in actual operation within 20 months from the date of their commencement. The works were formally opened on the 3rd

inst. in the presence of the Governor-General of South Russia, the town governor, the mayor, and other civil and military dignitaries. The occasion was one of general rejoicing among the inhabitants of Odessa, to whom a plentiful supply of that important element, water, was really a new luxury. Tribunes were erected round the Preobrachenski Square, in which stands the cathedral, for the ecclesiastical, civil, and military authorities, and the public. After high mass in the cathedral, the ceremony of blessing the water, which trickled gently from a fountain in the centre of the square, was performed. The mayor then received the key of the fountain from Mr. J. Quick, jun., the engineer of the water-works, and turned the water fully on, when a fine jet shot up into the air. This was a signal for a burst of music from the assembled military bands, the sound of which, however, was soon drowned in the applause of the delighted spectators. The opening ceremonial was followed by dinners, concerts, and fêtes throughout the whole city, all classes uniting to do honour to the great event. The water-works are of considerable extent, and are situated about a mile and a quarter from the banks of the Dniester. Between the river and the works is a vast marshy swamp, inhabited by wild animals, subject to heavy floods during the winter and spring, and which had, probably, never previously been trodden by human foot. Through this swamp an embankment was formed of soil taken from *terra firma*, and which was gradually extended forwards from the side of the works to the river. Through this bank and deep down into the marshy soil below was formed a cutting, from which the incoming water had constantly to be pumped. At the bottom of this cutting a culvert was built, through which the water is conducted from the river to the pumping-engines. This culvert enters the river at a point well below the ice level, so that no stoppage can ever occur in the supply at that point during the winter. The engines employed are of 1200-horse power, nominal, and are constructed on the Woolf, or high and low pressure double cylinder, principle. There are depositing reservoirs, containing upwards of 6 million gallons of water, four filtering-beds, and a covered pure water-tank at the works. Thence the water is pumped to Odessa through a 30-inch main, more than 26 miles in length, and having a total rise of 400 feet in that distance. Arrived in the town, the water is stored in covered reservoirs, which have been constructed close by the railway, and from which it is distributed over the town through 130 miles of distributing mains. Engines have also been provided at the storeage point to ensure supply should an accident occur at any time to the trunk main. There are upwards of 25,000 tons of pipes in this main, and some difficulty was experienced in obtaining so large a quantity within the required period, on account of the troubled times through which the iron trade has been, and still is, passing. But, notwithstanding this and the local difficulties which presented themselves in constructing the culvert through the morass, the whole work has been successfully accomplished in the short time already mentioned. For this great credit is due to the engineers, Messrs. Joseph Quick and Son, of Westminster, by whom the entire works were designed and executed. The contractors were Messrs. Laidlaw and Son, of Glasgow, and the engines were made by Messrs. Simpson and Co., of London. Those who know the active commercial spirit which pervades every quarter of Odessa will understand how highly the boon of a good water supply is prized, while at the same time they will wonder why such an important public want has remained so long unsatisfied.—*Correspondent of "The Times."*

Register of New Patents.

APPLICATIONS FOR LETTERS PATENT.

4001.—Messenger, T. G., Loughborough, "Improvements in pipe-joints and in the couplings thereof." Dec. 5, 1873.
4038.—Cockey, H., and Cockey, F. C., Frome, "Improvements in gas-stoves." Dec. 8, 1873.
4060.—Dupont, L., Covent Garden, Middlesex, "Improvements in gas-burners." Dec. 9, 1873.
4088.—Turner, F. W., Hanover, "Improvements in motors to be worked by gas and air." Dec. 11, 1873.
4092.—Ramsay, H. M., Twickenham, Middlesex, "Improvements in the treatment and disposal of sewage." Dec. 12, 1873.
4095.—Ditchfield, S. J., Watson, G., and Childs, J., Seaham Harbour, "Improvements in the construction of heating apparatus, and in the application of hydrocarbon or other volatile oils or spirits for heating purposes and generating steam." Dec. 12, 1873.
4128.—Duty, G., Mansfield, "Improvements in apparatus for measuring and delivering water." Dec. 16, 1873.
4130.—Phillips, J., Hammersmith, Middlesex, "Improvements in pipe-joints." Dec. 16, 1873.
4160.—Forbes, G. H., Broughton Rectory, Northampton, "Improvements in the manufacture of gas and quicklime." Dec. 18, 1873.
4163.—Walker, W. T., Highgate, Middlesex, "Improvements in purifying apparatus used in gas-works." Dec. 18, 1873.
4165.—Harrison, C. W., High Holborn, Middlesex, "Improvements in the manufacture of gas, and in the apparatus employed therein." Dec. 18, 1873.

GRANTS OF PROVISIONAL PROTECTION.

3781.—White, W., Hampstead, "Improvements in the precipitation of sewage and other foul waters, and in the preparation of precipitating materials." Nov. 30, 1873.
3885.—Harris, I. B., Fountainbridge, Edinburgh, "Improvements in the manufacture of hose and tubing." Nov. 27, 1873.
3886.—Harris, I. B., Fountainbridge, Edinburgh, "Improvements in the manufacture of flexible tubing." Nov. 27, 1873.
3902.—Morton, R., Stockton-on-Tees, "Improvements in refrigerators or apparatus for cooling liquids, parts of which improvements are also applicable to distillation, surface condensation, heating or cooling fluids, air, or gases." Nov. 29, 1873.
3910.—Bell, J., and Bell, R., Wishaw, N.B., "Improvements in utilizing the waste heat of materials employed in retorts, and in the apparatus or means employed therefor." Nov. 27, 1873.
3916.—Underhay, F. G., Clerkenwell, and Carter, A. E., Notting Hill, "Improvements in apparatus for preventing waste of water." Nov. 27, 1873.
3939.—Moore, B. T., Isleworth, Middlesex, "Improvements in water and other meters." Dec. 1, 1873.
3953.—Paget, F. A., Adelphi, London, "Improvements in the mode of and apparatus for softening and purifying water." A communication. Dec. 2, 1873.
3980.—Tasker, W., Halifax, "Improved machinery for forming and welding and finishing couplings used for connecting gas and water pipes." A communication. Dec. 4, 1873.
4001.—Messenger, T. G., Loughborough, "Improvements in pipe-joints and in the couplings thereof." Dec. 5, 1873.
4038.—Cockey, H., and Cockey, F. C., Frome, Somerset, "Improvements in gas-stoves." Dec. 8, 1873.
4060.—Dupont, L., Covent Garden, Middlesex, "Improvements in gas-burners." Dec. 9, 1873.

INVENTION PROTECTED FOR SIX MONTHS ON THE DEPOSIT OF COMPLETE SPECIFICATION.

4095.—Ditchfield, S. J., Watson, G., and Childs, J., Seaham Harbour, "Improvements in the construction of heating apparatus, and in the application of hydrocarbon or other volatile oils or spirits for heating purposes and generating steam." Dec. 12, 1873.

NOTICES TO PROCEED.

2534.—Robey, J., Manchester, "Improvements in treating sewage and other foul liquids for the economical removal and utilization of soluble and suspended impurities contained therein, and in apparatus for the same." July 25, 1873.
2543.—Hedley, T. A., Abchurch Lane, London, "Improvements in the manufacture, combination, and purification of gases for lighting and heating purposes, and in the apparatus employed therein." July 25, 1873.
2649.—Douds, D., and Hartsuff, J. H., Newcastle, Pennsylvania, U.S.A., "Improvements in steam-pumps." Aug. 7, 1873.
2680.—Carey, R., Brixton, Surrey, "Improvements in steam-engines and pumps." Aug. 12, 1873.
2759.—Clark, A. M., Chancery Lane, "Improved apparatus for regulating or controlling the supply of gas or water in buildings." A communication. Aug. 20, 1873.
2812.—Lake, W. R., Southampton Buildings, London, "An improved machine for forming the internal screw-threads of gas-fittings." A communication. Aug. 26, 1873.
2974.—Edwards, D. O., Bayswater, Middlesex, "Improvements in means and apparatus for producing and radiating heat." Sept. 10, 1873.
3205.—Forbes, G. H., Broughton Rectory, Northampton, "Improvements in compounds designed to be used as fuel or for the manufacture of lime, cement, plaster, and artificial stone." Oct. 3, 1873.
3588.—Rowley, J., Camberwell Road, Surrey, "Improvements in obtaining colouring matters and other substances from certain waste materials resulting from the manufacture of gas." Nov. 4, 1873.
3885.—Harris, I. B., Fountainbridge, Edinburgh, "Improvements in the manufacture of hose and tubing." Nov. 27, 1873.
3886.—Harris, I. B., Fountainbridge, Edinburgh, "Improvements in the manufacture of flexible tubing." Nov. 27, 1873.

PATENTS WHICH HAVE PASSED THE GREAT SEAL.

2071.—Leigh, J., Manchester, "An improved mode of treating sewage waters." June 11, 1873.
2174.—Louttit, K. M'L. P., Greenwich, Kent, "Improvements in the manufacture of gas for heating and lighting purposes, and in the apparatus employed therefor." June 21, 1873.
2247.—Carter, J., and Carter, J. E., Halifax, "Improvements in the manufacture of water or stench traps." June 28, 1873.
2259.—Henderson, A. C., Southampton Buildings, Holborn, "Improvements in water, liquid, gas, and steam gauges." A communication. June 30, 1873.
2342.—Bonneville, H. A., Paris, "Certain improvements in fluid-meters." July 7, 1873.
2404.—Robinson, J., West Bromwich, "Improvements in machinery or apparatus for charging and discharging retorts, ovens, and furnaces." July 12, 1873.
3005.—Valon, W. A. M'I., Gas-Works, Ramsgate, "Improvements in apparatus used in the manufacture of gas." Sept. 13, 1873.
3138.—Beale, J., East Greenwich, Kent, "An improved engine to be used for pumping gases, air, or fluids." Sept. 26, 1873.
3227.—Ritchie, C., Brixton, Surrey, "Improvements in apparatus for utilizing heat for heating, cooking, ventilating, and lighting." Oct. 4, 1873.
3441.—Seegers, L., Berners Street, Oxford Street, "Improvements in the construction and arrangement of apparatus for economizing the consumption and increasing the illuminating and heating powers of coal gas, water gas, and other inflammable vapours and gases, and mixtures thereof." Oct. 23, 1873.
3487.—Haseltine, G., Southampton Buildings, London, "An improved motive-power engine to be operated by the pressure of water, steam, or compressed air, and capable of use as a pump, blowing-engine, or gas-exhauster." A communication. Oct. 27, 1873.

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NOTE.—Quotations given for the small, which for Gas and Coke results is equal to the large.

TO GAS-FITTERS AND SMITHS.

WANTED, by the Bromley Gas Consumers Company, a steady respectable man, who is a thorough good workman, as a general Gas-Fitter, Service Layer, and Smith, who can repair and make carbonizing tools, coke barrows, &c.

Wages 35s. per week. A personal reference will be required.

Apply to the Secretary and Manager, Mr. George H. Osborn, Gas-Works, Bromley, Kent.

WANTED, by a young man, a situation as Fitter, Meter Fixer, Index Taker, &c.

Address M. M., care of Mr. King, 11, Bolt Court, Fleet Street, E.C.

ON SALE, cheap, a Gasholder, 36 ft. diameter by 12 ft. deep, Station Meter and Governor. Also lot of 6-in., 4-in., and 3-in., Mains, all in capital condition.

Apply to A. C. Fraser, New Barnet, Herts.

WANTED, a competent Foreman STOKER, at the Devizes Gas-Works; one who can give satisfactory reference as to efficiency, honesty, and sobriety. A dwelling-house in the yard, rent free, firing and light.

Any communication addressed to the Gas Office, Devizes, stating the age of applicant and what remuneration would be required, will have early attention.

Devizes, Dec 22, 1873.

The GRAND MEDAL of MERIT at the VIENNA EXHIBITION has been AWARDED to

GWYNNE & BEALE'S PATENT IMPROVED GAS-EXHAUSTERS,

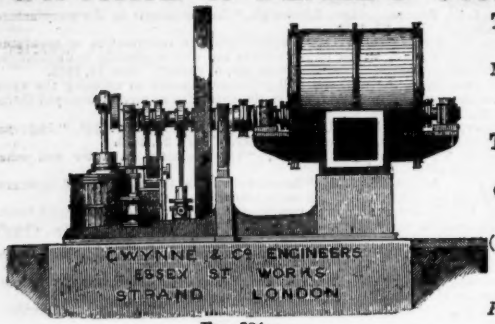

FIG. 224.

The BEST EXHAUSTERS IN THE WORLD.
Made under the personal superintendence of
Mr. BEALE,
The oldest Maker, Inventor and Patentee of
GAS-EXHAUSTING MACHINERY.
(It is NOT CORRECT to state that Mr. BEALE has RETIRED.)

Prices and every information on application.

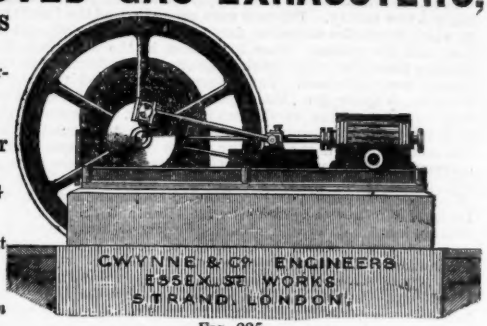

FIG. 225.

Fig. 224 represents one of those erected at the Imperial Gas-Works, Bromley, capable of passing 210,000 cubic feet of gas per hour. Several others of the same size are now on order for the same Company. These Patent Machines combine the highest quality of workmanship and materials, the largest bearings and wearing surfaces, with the **most perfect system of action yet discovered.** Fig. 225 represents one of a series of four at the Nottingham Gas-Works, each passing 52,500 cubic feet per hour. GWYNNE AND CO. *do not pretend to enter into a struggle with other makers in respect to cheapness. They have never sought to make price the chief consideration, but to produce Machinery of the very highest quality, and the most approved design and arrangement.* Their prices have been estimated with a due regard to the **excellence of the article produced,** and when this is taken into consideration, they have no fear for the result. The orders executed this season for Exhausters and alterations to their patented system amount to over 4,000,000 cubic feet of gas passed per hour, and to over 300 horse power for Engines to drive them. In every instance their work is giving the greatest satisfaction. Numerous testimonials and references can be given.

REGULATORS, BYE-PASSES, STOP-VALVES, GAS-VALVES, & MACHINERY FOR GAS MANUFACTURE, OF ALL SIZES,
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G. & Co. are now manufacturing for a London Gas Company three of their 210,000 *cubic feet Patent Gas Exhausters, and many of all sizes.*

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The superior quality of this well-known Cannel, as wrought by

THE NITSHILL AND LESMAHAGOW COAL COMPANY,

Is now generally admitted by all Gas Engineers.

PRICE AND ANALYSIS MAY BE HAD ON APPLICATION TO

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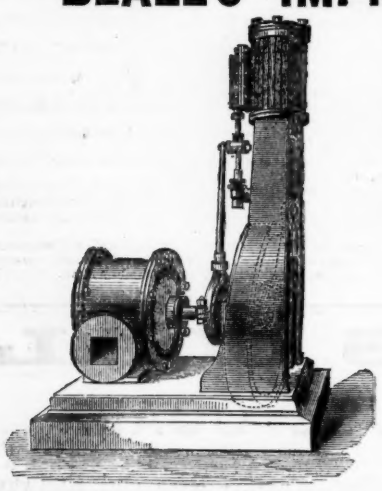
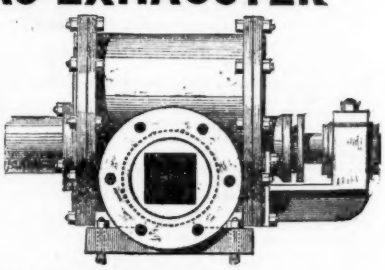


WITH
ENGINE COMBINED
ON
ONE BASE PLATE.



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HOW TO OBTAIN GOOD LIGHT AND CHEAP GAS.

Being a Popular Exposition of the Chemistry of Gas Lighting, with Practical Instructions in the best methods of burning Gas for Lighting, Cooking, and Heating; and Suggestions as to the proper Sizes of Interior Pipes, Arrangement of Lights, &c., &c.

ILLUSTRATED.

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JUST PUBLISHED, a revised and illustrated Reprint, with additions, of the Paper on

RETORT SETTING AND WORKING,

READ AT THE

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By E. S. CATHELS, Assoc. Inst. C.E.

To be had of Mr. W. B. KING, 11, BOLT COURT, FLEET STREET, LONDON, E.C.

Price 2s. 6d., post free.

"The first paper read was on the 'Setting and Working of Retorts,' by Mr. E. S. Cathels, of the Crystal Palace District Gas-Works. This was an exhaustive, and, to gas managers, an invaluable paper on the apparatus used in one of the most important processes in the manufacture of gas. It is a subject to which the author is well known to have given special attention, and we therefore commend his paper to the careful notice of those of our readers who are interested in the production of gas."—*From a Leading Article in "Engineering," on June* 10, 1870.

RETORT-SETTINGS.

MR. CATHELS

IS PREPARED TO SUPPLY

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IMPROVED RETORT-SETTINGS

(FROM 1 TO 9 RETORTS IN A BED),

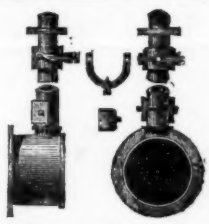
ADAPTED FOR EITHER COKE OR TAR AS FUEL,

Showing Plans, Transverse and Longitudinal Sections, and Elevations; easily understood by any retort-setter or bricklayer. These Settings are excellent gas producers, with great economy in fuel.

For terms, &c., apply to E. S. CATHELS, Assoc. Inst. C.E., GAS-WORKS, MONTREAL, CANADA.

"On the proper mode of setting the retorts the prosperity of a gaslight establishment mainly depends."—*Vide Peckstone's Treatise on the "Manufacture of Gas."*

BOX'S PATENT



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By the adoption of the improved ascensions and joints the trouble and annoyance of "jumping" stopped pipes is entirely obviated, while the time and labour saved will in a very short time amply compensate for the slight additional expense entailed in fitting them to existing apparatus.

In support of his own experience as to the advantages to be derived from the invention, the patentee has the pleasure to submit the following testimonial from the Engineer of the Phœnix Gas Company:—

Phœnix Gaslight Company, Bankside, S.E., Engineer's Office, Dec. 19, 1873.

Dear Sir,—I have fitted about 20 ascension-pipes at the Vauxhall Station of this Company with your patent joints, I am thereby enabled to remove the pipe when it is stopped and substitute a clean one in about ten minutes, cleaning out the obstructed pipe at leisure.

Until the happy time arrives when we can remove the necessity for "jumping" pipes at all, your joints will afford considerable relief. I trust your neat and ingenious contrivance will meet with the success it deserves.

Mr. W. Box, Crayford Gas-Works. Yours faithfully, C. Woodall.

For terms and further information apply to W. BOX, Gas-Works, Crayford, Kent.

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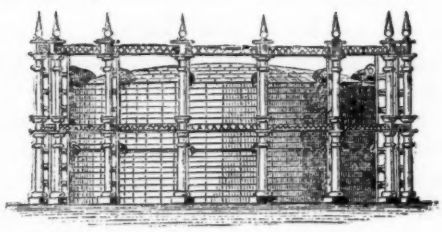

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N.B.—Estimates for all Gas Plant and Remodelling supplied on application.

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Address L. L., care of Mr. King, 11, Bolt Court, Fleet Street, E.C.

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WANTED, by a respectable married man, aged 32, a permanent situation as first-class FITTER, MAIN-LAYER, &c. Country preferred.

Address T. T. T., 33, Bishop Street, Portsea, Portsmouth.

WANTED, by a respectable man, a situation as GAS-FITTER. Is a good tinman. Can repair meters and take indexes, &c. Been some years in a Gas Company, and can have first-class reference.

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WANTED immediately, at the Gas- Works at Holbeach, Lincolnshire, containing twelve retorts, a STOKER, active, strong, and steady. Wages £1 a week the year through.

Apply to George Wright, the Manager, at the works; or to Richard Caparn, Esq., Solicitor, Clerk to the Company.

Holbeach, Dec. 24, 1873.

WORKING FOREMAN required for a small provincial Gas and Water Works within 50 miles of London, where the make of gas is 10 millions per annum, and an exhauster is used. The Water-Works require to work their engine from one to two days per week. The person appointed will have to superintend the entire working of the Gas-Works, drive the engines of the Water-Works, lay services, do all fitting and repairs required, and keep a weekly return. He will have entire charge in the absence of the Engineer. Must be well acquainted with machinery and the manufacture of gas, and be perfectly trustworthy. Moderate smith preferred. Wages, to commence, 27s. per week, with good house, gas, coals, and water.

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Pamphlet for Gas Companies to circulate amongst their gas consumers to increase day consumption, &c.

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An Examination in the Technology of the Manufacture of Gas will be held (in connexion with the Examinations of the Science and Art Department) in May next.

Intending Candidates should apply for programmes (which will be sent gratis) to the Secretary of the Society of Arts, John Street, Adelphi, London, W.C.

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THE Directors of the Birmingham and Staffordshire Gaslight Company are open to contract for the SALE of the AMMONIACAL LIQUOR produced at their works at West Bromwich and Adderley Street, Birmingham, together or separately, for a term of years to commence on the 1st of July, 1874.

Tenders will be received up to the 1st day February next, and any particulars required in the meantime may be obtained on application to the Secretary, at the Office of the Company, Old Square, Birmingham.

The Directors do not bind themselves to accept the highest or any tender.—By order of the Board,

Samuel Walsh, Secretary.

Old Square, Birmingham, Nov. 25, 1873.

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Further particulars may be ascertained upon application at the Vestry Hall, Harrow Road, between the hours of 10 and 4, Saturdays 10 and 2.

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No travelling or other expenses will be allowed.

By order,

Frank Detheridge, Vestry Clerk.

Vestry Hall, Harrow Road, Dec. 24, 1873.

A. C. FRASER, late of the Corporation Gas-Works, Middlesborough, is prepared, after 20 years experience, to advise Corporations and Gas Companies in the Erection of new and Improvement of existing Works.

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By J. O. N. RUTTER.
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THE TWENTY-SECOND VOLUME
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FROM GAS LIME.
This invention (protected by three patents) consists in a new method of turning the foul lime of Gas-Works to profit. The process is very simple and inexpensive, and can be worked by Gas Companies at a very small outlay.
By simply mixing the foul lime with tar it is converted in the first instance into an excellent fuel. By burning this fuel a very valuable material for building purposes is obtained, which can be used either as lime or cement or plastic. When used as cement it will be found equal to the best Portland in durability and hardness.
Licences to work the invention will be granted by the Patentee to Gas Companies on very reasonable terms.
For further particulars apply to Mr. E. MADDOCKS, Manager of the Gas-Works, KETTERING.

THE Scarborough Gas Company, owing to the removal of their works, will have FOR SALE, about October, 1874, the following APPARATUS, the whole of which is in exceedingly good condition:—
Fittings for 140 Retorts, consisting of mouthpieces, ascension, saddle, and dip pipes, and hydraulic and foul mains.
A Condenser, consisting of 40 12-in. pipes, with top and bottom boxes, and inlet, outlet, and bye-pass valves.
Two Scrubbers, each 7 ft. diameter and 16 ft. high, with valves as before.
Two Purifiers, 8 ft. 6 in. square and 5 ft. deep, 20-in. water lutes.
Two Cast-iron Water-Tanks, respectively 24 ft. by 16 ft. by 4 ft., and 20 ft. by 8 ft. by 4 ft. New in 1865.
Two Horizontal Engines, 4 h. p., two single-flue Cornish boilers, and two 20,000 feet per hour Beale's Exhausters. All new in 1866.
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A considerable length of 10-in. Cast-iron Socket and other Pipes.
An inspection of the above Apparatus is requested by the Officers of Companies requiring enlargements or extensions, and offers to purchase will be duly considered.
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Manager and Secretary to the Company.

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FIRE-BRICKS, GAS-RETORTS, & FIRE-CLAY GOODS of every description.
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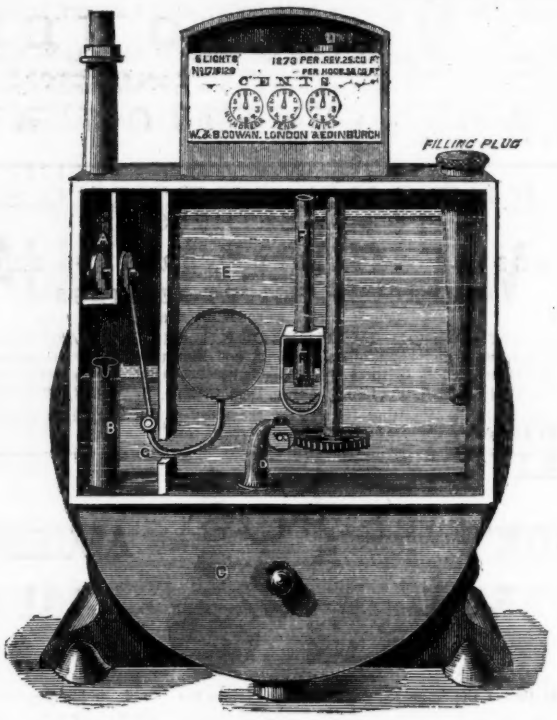
GAS STATION-METERS,
With all the joints planed.
TERMS, &c., ON APPLICATION.



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IN TIN CASE, PATENT SIDE VALVE ARRANGEMENT.

DESCRIPTION:

The gas passes from the valve-box A by the overflow-pipe B into the waste water box C, and upwards through the spout D to the measuring drum; E is the compensating fountain, in which also is the float, the lever of which, passing through the hole G, opens and shuts the valve.

When the water level in the meter lowers, the *bottom end* of the air or gas tube F becomes unsealed, thereby admitting air or gas into the upper part of the fountain, which, causing water to pass through the hole G, restores the level in the meter, when this action ceases.

The float and valve are beyond the influence of either inlet or outlet pressure, and the fountain is large enough for a year's supply.

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GAS-FITTERS TOOLS, STEAM COCKS, AND ALL KINDS OF JOINTS.
HYDRAULIC TUBES, CORE BARS, TELEGRAPH POSTS, COILS, &c.

London Agent—ALFRED LAKEMAN, 18, IRONMONGER LANE, CHEAPSIDE, E.C.

GAS PURIFICATION.

JOHN WM. O'NEILL AND CO.,
CONTRACTORS FOR
GAS PURIFICATION BY OXIDE OF IRON,
39, LOMBARD STREET, LONDON, E.C.

WILLIAM & BENJAMIN COWAN,
ESTABLISHED 1827,
WET AND DRY GAS-METER MANUFACTURERS,
KING HENRY'S WALK,
BALLS POND ROAD,
(NEAR DALSTON JUNCTION STATION,) LONDON, N.
BUCCLEUCH ST. WORKS,
EDINBURGH.

VICKARYS AND ROBERTSON,
Late JOHN VICKARY,
ESTABLISHED 1840,
GAS ENGINEERS, CONTRACTORS, IRON AND BRASS FOUNDERS,
WEST OF ENGLAND ENGINEERING WORKS, EXETER.
GASHOLDERS AND TANKS,
Retorts, Retort-Fittings, Condensers, Scrubbers, Purifiers, Station-Meters, Governors, Rack and Screw Valves. Gas and Water Mains always in Stock.
STEAM-ENGINES, EXHAUSTERS, SHAFTING AND GEARING, &c.
GAS-FITTINGS,
Including Chandeliers, Pendants, Hall Lamps, Brackets, Star and Sun Lights of all designs.
WET & DRY GAS-METERS,
Combining most recent improvements in principle and manufacture; upwards of 200,000 already in work, giving highest satisfaction.
(A guarantee of five years given with every Meter.)
PLUMBERS WORK, including Lift and Force Pumps; Cocks for Gas and Water and Steam; Brass Fittings.
HYDRAULIC AND GENERAL ENGINEERING
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D. BRUCE PEEBLES & CO.,
ENGINEERS, BRASSFOUNDERS, AND GAS-METER MANUFACTURERS,
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CONSUMERS WET METERS,
IMPROVED DRY METERS, STATION-METERS, GOVERNORS,
PATENT LAMP-REGULATORS,
EXPERIMENTING METERS, PRESSURE-GAUGES, &c.

HENRY SKOINES,

Contracting Gas Engineer,

For Erecting and Remodelling Gas-Works, of any magnitude, at Home and Abroad.

RETORT-HOUSE WORK.

CONTRACTOR for erecting Retort-Houses, Stages, Coal Stores, &c., and to erect the Ovens, supply and *set* the *Retorts* on his *improved* principle, whereby a proper and uniform heat is maintained with a great SAVING OF FUEL, and durability of workmanship.

He also supplies all necessary Fittings, including Evaporizing Pans, Furnace Doors and Frames, Mouthpieces, Crossbars and Screws, with Steel or Wrought Iron Lids, Ascension, H, and Dip Pipes, Wrought or Cast Iron Hydraulic Main, or Valves.

SHIPPERS and the Trade supplied with any of the above Fittings. Iron, Clay, or Bricks for Brick Retorts, with WORKING DRAWINGS or Models for the settings, on his plan, for from one to twelve Retorts with one furnace.

RETORT SETTERS SENT TO ANY PART OF THE WORLD.

HENRY SKOINES

Also supplies and erects Condensers, Washers, Scrubbers, Boilers, Engines, and Exhausters, Purifiers with Oak or Deal Grids, Bye-Passes, Valves, Station-Meters, Test Cocks, Gauges, &c.

HENRY SKOINES

Is also prepared to supply and erect Gasholders, both Single Lift and Telescopic, with Wrought or Cast Iron Columns and Girders, with all the usual fittings, and for Wrought or Cast Iron Tanks, and for excavating and erecting CONCRETE, Brick, or Stone Tanks; Governors, Bye-Passes, and Stop Valves. Tar, Water, and Syphon Pumps, and Tools of every description for the works kept in stock.

STREET MAINS AND SERVICES.

CONTRACTOR for Main and Service Laying. Lamps and Lamp Columns supplied and fixed, with or without Meters.

Gas-Works Leased and kept in Repair by Yearly Contract or otherwise.

NOTE.—Experimental or test works supplied upon the shortest notice.

FOR ESTIMATES, TESTIMONIALS, &c.

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THE THAMES BANK IRON COMPANY,

(Successors to LYNCH WHITE,)

SUPPLY FROM STOCK

CAST-IRON RETORTS, SOCKET-PIPES for GAS or WATER PURPOSES, FLANGE-PIPES for STEAM, RAIN-WATER PIPES and GUTTERS, HOT-WATER PIPES and BOILERS, and all requisite Connexions for same; also LAMP-COLUMNS, LAMPS, WROUGHT FRAMES, WROUGHT-IRON TUBING, &c., &c.

All kinds of Gas-Works Apparatus and General Castings made to Pattern or Drawing.

ADDRESS—

OLD BARGE WHARF, UPPER GROUND STREET, LONDON, S.E.

SCHOLL'S

PATENT PLATINUM

GASLIGHT PERFECTER.

Extract from Report by Dr. Letheby:—

"The results have been very remarkable, for they show an average increase of 63 per cent. on the illuminating power of the gas. I am of opinion, therefore, that the invention is of great practical value."

Extract from Dr. Frankland's Course of Lectures at the Royal School of Mines, February, 1868.

"Scholl's Platinum Perfecter is one of the most important inventions of modern times in connexion with the burning of coal gas."

Price 1s. each for Fishtail Burners.

To be had retail of Gas-Fitters and Ironmongers.

JOHN SCHOLL, Manufactory: 41 & 42, BERWICK STREET;

Retail Depot: 198a, OXFORD STREET, LONDON, W.

Terms on application. N.B.—A specimen sent free on receipt of Twelve stamps.

*** Further testimonials from Drs. Frankland and Crooks, showing the great practical value of this invention, will be shortly published.

GEORGE ANDERSON,

GAS AND CONSULTING ENGINEER,

19, NORTHUMBERLAND STREET, STRAND, W.C.

MR. ANDERSON advises Companies on all matters connected with the manufacture of Gas and the construction of Works.

PATENTEE and MANUFACTURER of the following Inventions:—

RETORT SETTINGS, heated by tar without the production of smoke.

STEAM-ENGINES and EXHAUSTERS, separately or combined.

FOUR-WAY VALVES, one of which is equal to three ordinary Valves.

STATION GOVERNORS—the Gasholder cannot tilt and cause accident.

BREEZE AND TAR FUEL MACHINE.

A Pamphlet containing Eighteen Illustrations of the foregoing, with letterpress on the construction of Works, post free, 2s. 6d.

N.B.—The second edition of this Work, *now ready*, co illustrations of the Machine for converting Breeze and Tar into Fuel for heating the Retorts.

"The Author is well qualified to speak authoritatively upon the important subjects to which his pamphlet refers."—*Artizan.*

SAM. CUTLER & SONS,

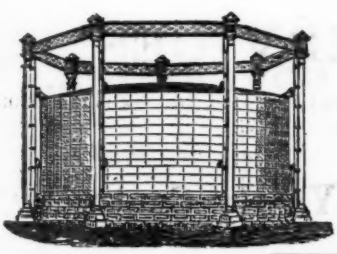
CONTRACTING GAS ENGINEERS,

GASHOLDER & GENERAL GAS APPARATUS MAKERS,

MANUFACTURERS OF

BOILERS, IRON ROOFING, IRON BRIDGES,

AND GENERAL IRONWORK.



S. C. AND SONS undertake Contracts of any magnitude for the **Erection of new and Remodelling of existing Gas-Works,** for **Gasholders, Cast and Wrought Iron Tanks, Iron Roofs,** and every description of **Apparatus** for the Manufacture and Distribution of Gas.

Special attention is invited to their **"Improved Condenser,"** which is very effective, and much approved; also to their patterns of **Annular** and other **Condensers, Scrubbers,** and **Purifiers,** of all sizes, which they arrange either with **Centre** or Ordinary **Slide Valves.**

WORKS FOR THE SUPPLY OF

VILLAGES, MANSIONS, FACTORIES, &c.

S. C. AND SONS undertake the **Supply** and **Laying of Mains** for **Gas and Water,** and supply all Castings, Connexions, and Fittings for Retort-House, Works generally, and for Streets. They also supply **Valves** of all descriptions, Iron and Clay Retorts, Hotpressed Retort-Lids, Steel Charging-Scoops of improved make, for which they have special machinery, Improved Coke and Coal Barrows, Cross-Bars and Screws, Bolts and Nuts, Furnace and Stoking Tools, Iron and Wood Purifier-Sieves, Lead, Yarn, Borings, &c., including every requisite whatsoever for a Gas-Work, a well-assorted stock being kept of those goods most in request.

SOLE MAKERS OF BRETT'S PATENT COKE BARROW.

Experienced Retort Setters sent to any part of the Kingdom.

Address: PROVIDENCE IRON-WORKS, MILLWALL, LONDON.

SAMUEL PONTIFEX, Consulting Gas Engineer, having retired from the Great Central Gas Company, is now prepared to furnish PLANS and SPECIFICATIONS, as well as ADVISE Provincial Gas Companies as to the erection of new, or alteration and enlargement of existing works.

Offices: 22, Coleman Street, LONDON, E.C.

MR. WILLIAM DORE (19 years Gas Engineer and Accountant) may be CONSULTED upon all matters relating to the manufacture and distribution of gas, and the management, accounts, or transfer of gas undertakings.

Office, 4, Picton Place, Neath, SOUTH WALES.

MR. NORWOOD EARLE, late of the Dover Gas-Works, is prepared, after 17 years experience, to undertake the duties of SURVEYOR to Gas Companies and Corporations in all matters relating to the Distribution of Gas and Gas Testing. Contracts entered into for the Survey of Mains, Services, Public Lamps, &c., in order to reduce the per centage of unaccounted-for gas to the lowest possible amount.

Valuations for Assessment, Transfer, and other purposes.

Offices, MANSION HOUSE CHAMBERS, 12, Queen Victoria Street, LONDON, E.C.

Mr. ALFRED LASS,

60, CORNHILL, LONDON, E.C.,

Is prepared to open the Books, and, if necessary, keep the Accounts of Gas and Water Companies.

To examine the Books and Accounts, and prepare Balance-Sheets for the information of Directors.

To assist Secretaries in preparing Balance-Sheets, according to the "Gas-Works Clauses Act, 1871;" or may be consulted with respect to Accounts generally.

ADDISON POTTER,

WILLINGTON QUAY,

NEAR NEWCASTLE-UPON-TYNE,

Manufacturer of Clay Retorts, Fire-Bricks and every description of Fire-Clay Goods.

BRONNER'S PATENT GAS-BURNERS give 99 per cent. of light, as compared with 27 per cent. given by ordinary burners, with equal consumption of gas.—*Vide* "Gas Referees Report," published June, 1869.

HENRY GREENE AND SON, Sole Consignees of Brönner's Patent Improvements in Gas Lighting, 16 and 17, King William Street, LONDON, E.C.

JAMES OAKES & CO.,

ALFRETON IRON-WORKS, DERBYSHIRE,

AND

WENLOCK IRON WHARF, 20 & 22, WHARF ROAD

CITY ROAD, LONDON, N.,

Beg to inform Gas and Water Companies and the public, that they keep in stock in London all the CASTINGS in general use in Gas and Water Works, including Iron Retorts, Socket and Flange Pipes, Bends, Branches, and Syphons of all sizes, Lamp Columns, &c., &c.

N.B.—Orders for Cast-Iron Tanks, Girders, Columns, Cylinders, and all irregular castings, will have immediate attention. CHARLES HORSLEY, Agent.

BELGIAN CLAY RETORTS.

J. SUGG and CO., late ALBERT KELLER, GHENT.—The removal of the import duties on Earthenware permitting the entry of Clay Retorts into England, Messrs. Sugg, of Ghent, beg to draw the attention of the Gas Companies of London, and other Cities, to the very superior quality of the RETORTS manufactured by them. They can be made of any size, in one piece, and of any form. The price will be in proportion to the weight, and very moderate in comparison to their value.

Communications addressed to J. SUGG & CO., GHENT, will receive immediate attention.

TO GAS COMPANIES.

GEORGE McKAIG,

MANUFACTURER OF

GAS-PURIFYING WOOD SIEVES

153, CLEVELAND STREET,

DONCASTER.

It requires but one trial to prove the Superior Make, Strength, and Durability of these Sieves.

FIRE-CLAY RETORTS.

WILLIAM FRASER,

INVERKEITHING,

(Owner of the Works at which Fire-Clay Retorts were first made), can supply

RETORTS, FIRE-BRICKS, &c.,

to any extent.

References can be given to managers of above a hundred Gas-Works whom he supplies.

He ships at Charlestown his

CELEBRATED HALBEATH STEAM COALS,

on Navy List.

B. CARPENTER'S

IMPROVED WOOD SIEVES

FOR

GAS PURIFIERS & SCRUBBERS.

WORKS:

22, HERMES STREET, PENTONVILLE ROAD,

LONDON, N.

The above Sieves are used by all the Gas Companies in London and a great many in the country. Their utility, durability, and cheapness combined, render them superior to all others.

Testimonials from Gas Engineers who have tested their qualities forwarded on application.

All orders punctually attended to, and estimates given if required.

THE IMPERIAL METER COMPANY, LIMITED,

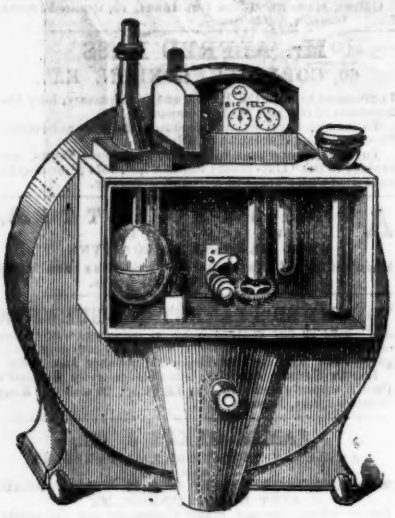
MANUFACTURERS OF

WET AND DRY GAS-METERS,

PRESSURE-GAUGES AND GOVERNORS, AND STREET-LAMP REGULATORS.

FACTORIES:

KING'S ROAD, LONDON, N.W., and GRAY'S INN ROAD, LONDON, W.C.



Front View.

THE

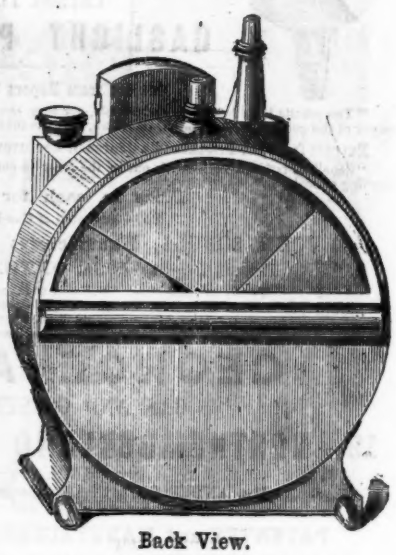
IMPERIAL

COMPENSATING

WET GAS-METER.

DE CASTRO & BURTON'S

PATENT.



Back View.

I. **This Meter is more simple in construction than the common non-compensating Meter.**
II. **An unvarying water-line is maintained.**
III. **No amount or kind of pressure will cause it to "flood."**
IV. **It is practically unaffected by "tilting."**
V. **The friction is less than in any other Meter; and**
VI. **It will last for twelve months without requiring to be refilled.**

THE IMPERIAL METER COMPANY, LIMITED, ALSO MANUFACTURE COMMON NON-COMPENSATING WET GAS-METERS OF ALL SIZES, BOTH IN TIN AND CAST-IRON CASES.

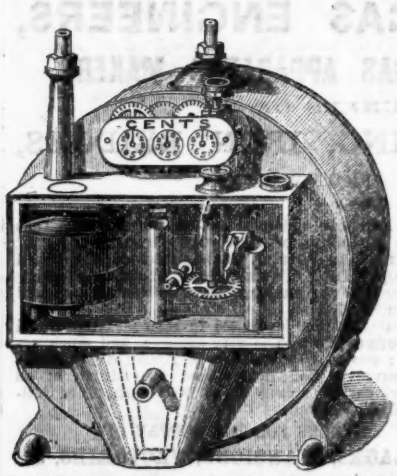
THE COMPENSATING

WET GAS-METER

IS UPHELD FOR

TEN YEARS

WITHOUT CHARGE.



THE IMPERIAL WET GAS-METER.
Non-Compensator.

STATION-METERS

WITH PLANED JOINTS,

AND

GOVERNORS,

MADE TO ORDER

Mr. GEORGE MACKANESS will represent this Company in the Provinces.

OFFICES: 41, FLEET STREET, LONDON, E.C.

W. MOORE, Secretary.

☞ *All Communications to be addressed to the Secretary.*

THE IMPERIAL METER COMPANY, LIMITED,

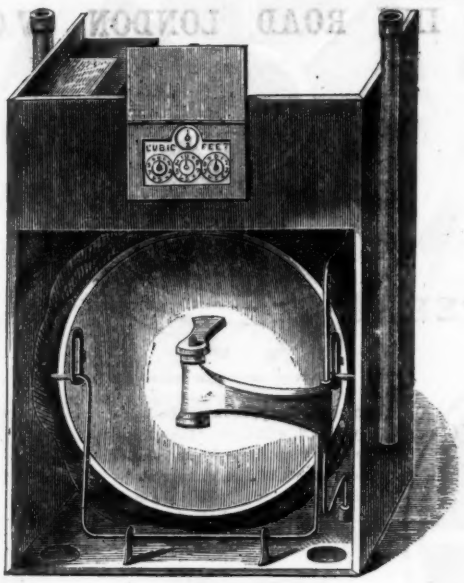
MANUFACTURERS OF

WET AND DRY GAS-METERS,

PRESSURE-GAUGES AND GOVERNORS, AND STREET-LAMP REGULATORS.

FACTORIES:

KING'S ROAD, LONDON, N.W., and GRAY'S INN ROAD, LONDON, W.C.



Front View.

THE

IMPERIAL

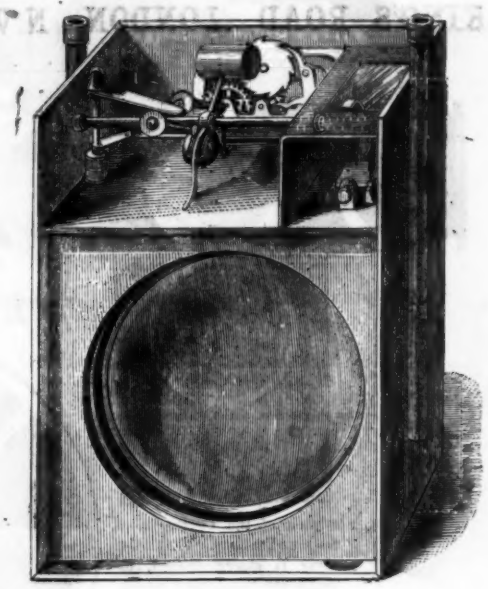
DRY

GAS-METER

SINGLE DIAPHRAGM.

TELLING & JOHNSON'S

PATENT.



Back View.

I. The mechanical construction of this Meter is simpler and stronger than any other.
II. About half as much leather is used as in ordinary dry Meters.
III. The Meter has only one valve, and this cannot "stick."
IV. The lights maintain perfect steadiness and strength of flame. There is no "draw."
V. The gas consumed can only be measured from the inlet to the outlet, and
VI. The index cannot be made to register backwards.

THE IMPERIAL METER COMPANY, LIMITED, ALSO MANUFACTURE ORDINARY DOUBLE DIAPHRAGM DRY GAS-METERS OF ALL SIZES, BOTH IN TIN AND IN CAST-IRON CASES.

SPECIAL ATTENTION

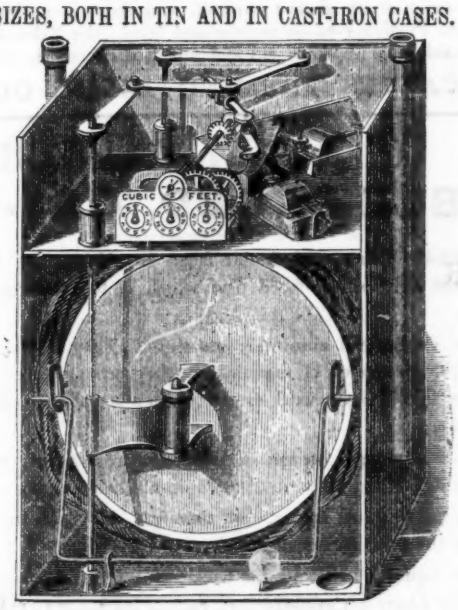
IS PAID TO THE

MANUFACTURE OF

STREET-LAMPS

AND

REGULATORS.



EVERY

DRY GAS-METER

IS UPHELD FOR

SIX YEARS

WITHOUT CHARGE.

THE IMPERIAL DRY GAS-METER.
Double Diaphragm.

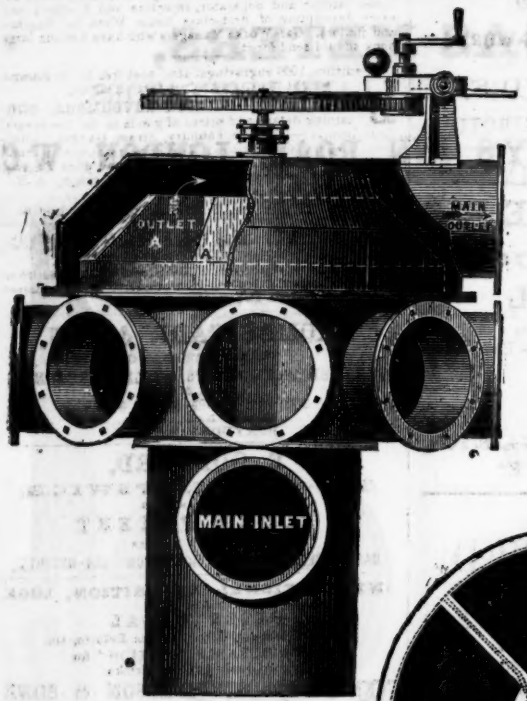
Mr. GEORGE MACKANESS will represent this Company in the Provinces.

OFFICES: 41, FLEET STREET, LONDON, E.C.

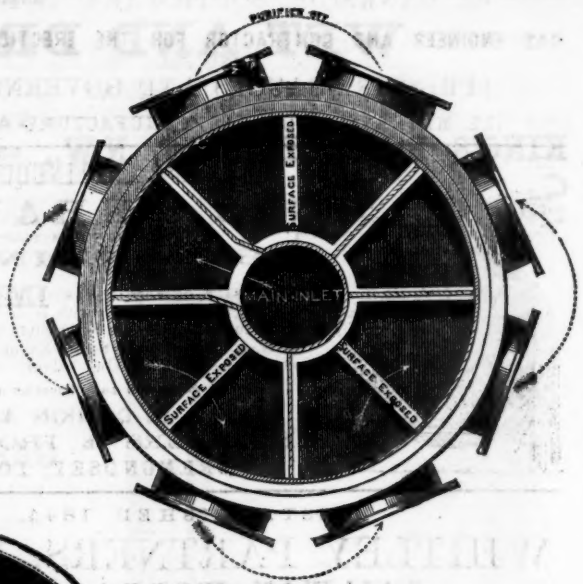
W. MOORE, Secretary.

☞ *All Communications to be addressed to the Secretary.*

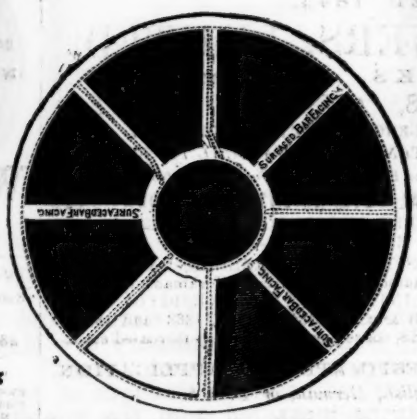
C. & W. WALKERS' PATENT CENTRE-VALVES.



Elevation of the Centre-Valve for four Purifiers. The safety cover is shown broken, to enable the Valve itself, which is inside, to be seen.



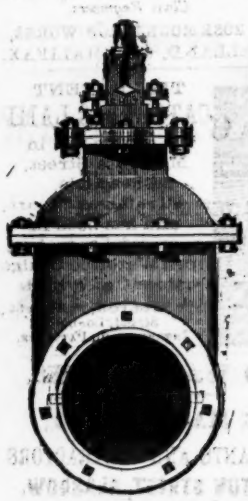
Plan of the Body, showing the Valve lying in it, with three of the facings, which were formerly exposed to settlements of dirt, carbon, naphthaline, &c., but which are now always covered by the surfaced bar-facings of the Valve. (See below.)



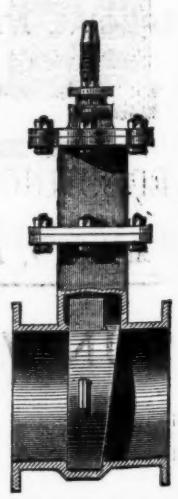
Plan of the Valve, or upper portion, showing the surfaced bar-facings referred to above.

These PATENT CENTRE-VALVES are the most perfect and certain means for working Purifiers. The Valve itself is protected from all injury inside the safety cover. The working of the Valve is so easy, and so governed by the stop-catch movement, that the Purifiers can be instantaneously changed in the dark as well as in daylight. They are scraped perfectly true, metal to metal, the facings heretofore exposed are always covered, and there is nothing more reliable, certain, and durable in a gas-works. By their use the floor of the Purifying-house is clear and level; the Valve and all connexions being beneath the floor, out of the way of working. A very considerable improvement and saving is effected in the cost of the connecting-pipes.

FOUR-WAY CENTRE-VALVES FORMING INLET, OUTLET, AND BYE-PASS.



C. & W. WALKERS'
DOUBLE-FACED GAS-VALVES.



These solidly constructed double-faced Gas-Valves are superseding the old system of the light, single-faced disc, which is too uncertain and unreliable in large bores.

They are guaranteed absolutely gas-tight. They are very massive and rigid, and by improved modes of manufacture they are produced at very little excess in cost over the old light, weak system, which is liable to spring and bend, and become leaky.

The Valve is a rigid wedge of solid cast iron, having two perfectly scraped surfaced facings fitting between the two on the body, which are also surfaced.

A spring in two short halves, and, therefore, not liable to break, is used only for scraping the front facing clean.

The front facing is vertical; the back facing forms the wedge.

At a slight additional expense both flanges are faced to bolt to main-pipes.

GASHOLDERS, TELESCOPE & SINGLE-LIFT, of LARGEST DIMENSIONS.

PURIFIERS, SCRUBBERS, CONDENSERS of most Improved Description.

WOOD SIEVES FOR PURIFIERS,

Which have now been in use for more than ten years, and their advantages and durability fully established. They are made entirely by steam machinery in very large quantities at the most moderate cost.

MIDLAND IRON-WORKS, DONNINGTON, near NEWPORT, SHROPSHIRE; 8, FINSBURY CIRCUS, LONDON.

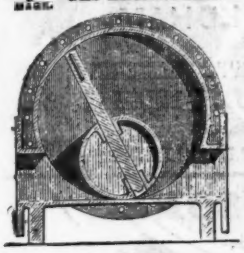
ALFRED WILLIAMS,

PHŒNIX FIRE-BRICK WHARF,

64, BANKSIDE, SOUTHWARK, LONDON, S.E.

GAS ENGINEER AND CONTRACTOR FOR THE ERECTION OF GAS-WORKS,
AND FOR THE
SUPPLY OF RETORTS, FIRE-BRICKS, CAST-IRON MAINS,
AND ALL MATERIALS FOR GAS MANUFACTURE AND DISTRIBUTION.

TRADE MARK. J. BEALE'S PATENT GAS EXHAUSTER.



BEALE'S CONTINUOUSLY ACTING
GAS EXHAUSTERS
ARE NOW MANUFACTURED BY
B. DONKIN & CO.

MR. J. BEALE, of East Greenwich, having retired from business, has made an arrangement with B. DONKIN & CO. for the sole manufacture of his Patent Solid-Slide Gas Exhausters.

B. D. & Co. also make Steam-Engines to drive Gas Exhausters direct or otherwise, and Gas-Valves.

Estimates and Prices on application to

B. DONKIN & CO.,
ENGINEERS & IRONFOUNDERS,
BERMONDSEY, LONDON, S.E.

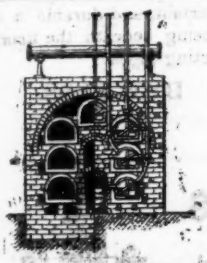
ESTABLISHED 1844.

WHITLEY PARTNERS, LIMITED,

RAILWAY WORKS, LEEDS,
ENGINEERS, FOUNDERS, AND LICENSEES;
MANUFACTURERS OF IMPROVED STEAM-ENGINES, BOILERS, PUMPS, &c.;
MAKERS, BY SPECIAL MACHINERY, OF PATENTED MECHANICAL INVENTIONS,
Comprising numerous Labour-saving Appliances and Economizers of Fuel and Motive Power;
CONTRACTORS TO THE EUROPEAN & COLONIAL GOVERNMENTS & CORPORATIONS;
MERCHANTS AND SHIPPERS OF MACHINERY, METALS, AND HARDWARE;
AWARDED
THE FIRST PRIZE MEDAL AT THE EXPOSITION UNIVERSELLE, PARIS, 1867,
"For Improved Construction, Excellence of Material, and Superior Workmanship;"
TWO GRAND GOLD MEDALS AT THE MOSCOW INTERNATIONAL EXHIBITION, 1872;
ALSO THE FIRST PRIZE MEDALS AT LEEDS AND LYONS IN 1858, 1868, and 1872.
"REDUCTION IN PRICES OF PEET'S VALVES, consequent upon largely increased sales."

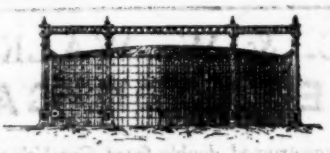
ILLUSTRATED CATALOGUES AND ESTIMATES ON APPLICATION.
Correspondence conducted in English, German, or French.

Samples of Specialties may be inspected at Stand No. 542, Group XIII., in the English Machinery Annexe of the Vienna Exhibition, 1873. For List of same see German Official and "British Section" Catalogues.



HENRY SKOINES,

PATENTEE
AND
CONTRACTING
GAS
ENGINEER,
FOR



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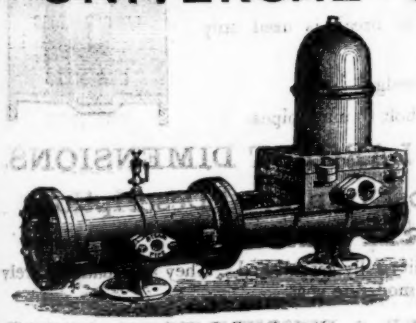

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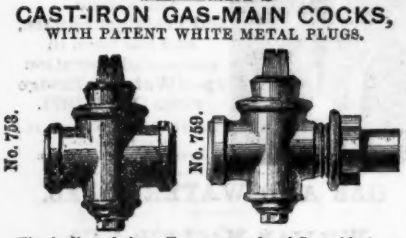

The bodies of these Taps are made of Iron, black or galvanized, and the Plugs of Patent Metal. They are warranted not to set fast or corrode as do iron or brass Cocks, will always work easily, are strong, well made, durable, of little or no intrinsic value, and, therefore, not likely to be stolen; and the PRICES are (especially upon the larger sizes) FULLY 50 PER CENT. LESS THAN BRASS COCKS.
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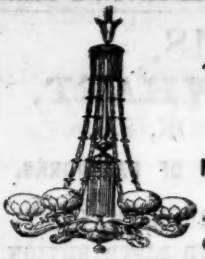

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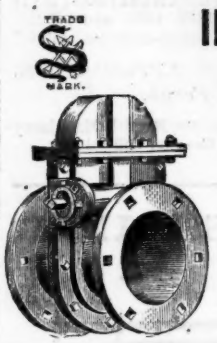

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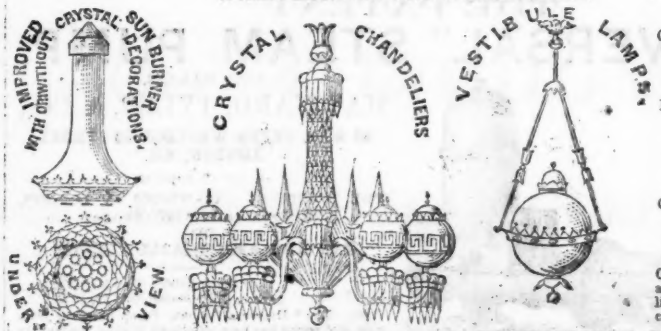

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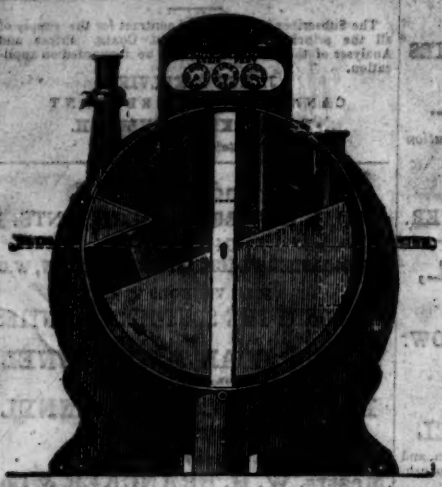

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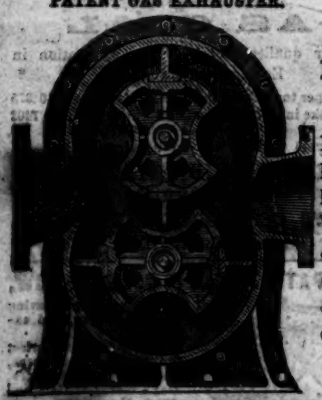

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